THE

CABINET OF USEFUL ARTS.

CONDUCTED BY THE

REV. DIONYSIUS LARDNER, LL.D. F.R.S. L.&E.
M.R.I.A. F.R.A.S. F.L.S. F.Z.S. Hon. F.C.P.S. &c. &c.

ASSISTED BY

EMINENT SCIENTIFIC MEN.

DOMESTIC ECONOMY.

VOL. II.

ANIMAL AND VEGETABLE ALIMENTS USED BY THE VARIOUS NATIONS OF THE WORLD;
AND THE PROCESSES TO WHICH THEY ARE SUBJECTED.

BY

MICHAEL DONOVAN, ESQ.,

LATE PROFESSOR OF CHEMISTRY, MATERIA MEDICA, AND PHARMACY,
TO THE COMPANY OF APOTHECARIES IN IRELAND.

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ERRATUM

Page 125, lines 21, 22, *for* "the best of all lamp oils," *read* "an oil useful for many purposes, but unfit for Argand lamps."

DOMESTIC ECONOMY.

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VOLUME THE SECOND.

CHAPTER I.

APPETITE, EPICURISM, AND CRUELTY TO ANIMALS.

The Creator of mankind, in forming the two beings who were to be the parents of the vast population now spread over the face of the globe, acted in conformity with the general principle, apparent in all his works, that of accomplishing the greatest objects by the simplest means. Instead of calling into existence millions of human creatures at once, and dispersing them throughout the world, the smallest number that would answer the purpose were formed, and in their miraculous structure were infixed such provisions as secured the preservation and increase of the species. One of these, and the only one to which reference need here be made, is that ever-vigilant monitor, which, by an irresistible sway, continually impels us to the periodical replacement of the waste which the body undergoes during the working of the vital mechanism. This monitor is appetite; without its urgent and frequent appeals, it were a contingency, liable to be influenced by choice or memory, whether the vital flame would be extinguished for want of fuel.

The sway of appetite over men's lives and actions is not the arbitrary exertion of a power which makes no return for obedience. Compliance is the fulfilment of an agreeable duty; and the source of a real enjoyment, which he, who has been temporarily rendered incapable of relishing, is most competent to appreciate.

Yet by improper indulgence this gratification is converted into a source of misery, and becomes the instrument of shortening instead of continuing life. Inordinate addiction to the pleasures of the table is certainly one of the most degrading vices that can disfigure the human character. The cloyed palate of the epicure no longer relishes that simple fare which adequately nourishes the body, appeases hunger, and satisfies the wants of those, whose relish for plain food is not sophisticated by often repeated excess. For the epicure, all nature is put in requisition; and torture, in addition to death, is inflicted on God's creatures, to attain some fanciful flavour or relish discoverable only by a wickedly whimsical glutton, whose exhausted appetite requires unnatural excitement.

It is a question whether more use is made of animal food than is either necessary or wholesome; and whether the unlimited dominion assumed by man over the lives of all animals was ever deputed to him by divine authority. This question resolves itself into one of serious import: Do we unnecessarily sacrifice animal life to artificial wants, and to propensities which we are bound to control rather than to indulge? It is not the province of this volume to enter into the subject: but, whatever may be the amount of man's dominion, it does not admit of doubt, that it should be exercised with humanity to the meanest animal; and that modes of death should be selected which, without rendering the food less wholesome, shall terminate life with the least possible suffering.

"By Heaven's high will the lower world is thine,
But art thou cruel, too, by right divine?
Admit their lives devoted to thy need,
Take the appointed forfeit,—let them bleed.
Yet add not to the hardships of their state,
Nor join to servitude oppression's weight—
Beyond thy wants 'tis barb'rous to annoy,
And but from need 'tis baseness to destroy. **PRATT.**

'The sum is this, if man's convenience, health,
Or safety interfere, his rights and claims
Are paramount, and must extinguish theirs.

Else they are all—the meanest things that are—
As free to live, and to enjoy that life,
As God was free to form them at the first,
Who in his sovereign wisdom made them all.—
Mercy to him that shows it is the rule—
By which Heaven moves in pardoning guilty man."
COWPER.

Whether or not mankind comply with the humane principles of these two amiable poets, it may be worth while to inquire at some length in the present chapter. To keep the subject constantly before the eyes of the world, has at least a better chance of being ultimately useful, than hopelessly to relinquish all attempts at ameliorating the sufferings of that portion of animated nature which cannot plead its own cause.

We need not extend our researches to remote ages or nations, for evidence of the sacrifices that always have been, and still are, made to epicurism: we shall find sufficient at home, amongst the refinements of civilisation. From all living things are collected the delicate morsels which can tempt a palate worn out by continued gratification; and to modern as well as ancient luxury might be applied the saying of the historian, "Vescendi causâ terrâ marique omnia exquirere." The most interesting, amusing, and even endearing qualities of animals, cannot protect them from the rapacity of the epicure with whom the single quality of sapidity outweighs every other consideration, although perhaps a dozen lives and diminutive bodies must be sacrificed for one scanty meal. This surely is true with regard to singing birds. The French markets are well supplied with all sorts: the blackbird, the thrush, the lark, the redbreast, the nightingale, the whole choir of nature's musicians are in requisition by the gourmand, who finds no other enjoyment in them than as the ingredients of a favourite fricassee. Throughout London, at certain seasons, are to be seen the impaled bodies of thousands of larks, those pretty warblers whose aërial frolics divert as much as the sweetness of their song delights. Is the miserable half-ounce of flesh on the body of this pride of songsters of greater relish than its contributions to the more refined pleasures of man, to the imagery of the poet, or to the embellishment of the rural scene? Elsewhere appetite is *invited* by the spectacle of cages closely crowded with live quails, where there is just room for their enlarged and glutted bodies; and where, in fruitless efforts to extricate themselves from their prison, they await the hour that consigns them to the stew-pan. But the glutton will defend himself by the flimsy argument, that it is necessary to thin the species. Amidst the myriads of the smaller birds, his destroying efforts are of little avail; and the fact may as well stand confessed that a depraved appetite is the incentive.

It is so common in some streets of London, as to excite little emotion, to see hundreds of live eels exposed for sale, in boxes, stratified with sand, giving appalling evidence of vitality by their writhings; and still more exquisitely, when the skin is torn from the quivering flesh, and the struggling creature is slowly relieved from its tortures by being broiled on the gridiron. There is no excuse for such practices: for although the tenacity of life evinced by the eel has been pleaded, the real and concealed object is flavour; there is nothing easier than to kill this fish; it is done in a moment by piercing the spinal marrow with a sharp bodkin, close to the back part of the skull.

The excessive cruelty which epicurism is in this case the cause of, is the more to be lamented, as there is no real improvement of flavour; and the eel is just as wholesome and palatable food without such treatment as those fishes are which die immediately on leaving the water, and are thus secured by nature from ill-usage.

In the shell-fish shops of the metropolis, we constantly see exposed for sale an array of living lobsters, conveniently corded, in order that the creature may placidly submit to the process of boiling to death. A thoroughly accomplished cook will not presume to send a lobster to table, unless, previously to boiling, he has proved not only its being alive, but sensitively so, by pushing in the eyes so as to produce quick convulsions of the claws. Amongst modern improvements in gastronomy, is the art of crimping various sorts of fish. The cod is brought alive in well-boats to Gravesend. Were it attempted to bring the fish to London it would be killed by the fresh water, and the subsequent process rendered unavailing. Each fish is then taken out of the water alive, and receives a stroke on the head, which stuns but does not kill it. Close inspection will always discover by a fracture or other injury where this blow had been given. Sufficient vitality remains to preserve the contractility of its flesh. Arrived in London the fish is cut down to the bone, in several transverse sections: the fibre contracts, a certain ruggedness appears on the cut surface; and the flesh when boiled becomes firm and flaky. A fishmonger informs me, that there is not the slightest advantage in this process: if firmness be gained, flavour is lost: but it is rendered necessary by the mistaken notions and fancies of the public. Had the fish died, by being brought to London through fresh water, or by having received too violent a stroke on the head, this desirable aspect of its flesh could not be attained, as the muscle would lose its contractility. In some cases the cod recovers so much as to move, and in one instance that came to my knowledge it actually leaped off a table.

The turtle is the miserable victim of the most unnecessary cruelty, in order to concentrate all its unlucky perfections in the epicure's favourite but retributive dish. A genuine turtle-gourmand proceeds according to the following disgusting process, performed on the live animal. The day before the wretched animal is to be dressed, it is suspended by the two hind fins: a cord, with a heavy weight attached, is fastened round the neck, in order to draw it out, that the head may be cut off with the more ease. The head being removed, the body hangs in the same position all night; and it is dreadful to think that for a long time after the body will remain alive, and even the head will move. This is comparable to the fact related by Vincent le Blanc from which we turn with disgust. He says, that when the king of Pegu intended a tortoise for his table, he caused the head to be cut off five days before the feast, to the end of which time the animal continued to live.

Those who are curious in tortoiseshell wares little reflect on the practices which they are the means of encouraging. The living tortoise, as soon as captured, is placed over a fire, and roasted even until the shell loosens from its back. Deprived of its natural defence, it is returned to the sea; not through mercy, but in order that it may acquire a new shell, and be stripped of it by the same inhuman method, should it be again captured.

It is a published fact, that some butchers make it a practice to suspend calves by the hind legs for some hours previously to killing them, and then to bleed them slowly to death, in order to render the flesh white. For the attainment of the same useless object, this most harmless of all creatures is made to suffer during the whole period of its short existence. During the first eight weeks of its life, it is bled in the neck, perhaps twice every week, in order to prevent its getting into robust health, which might make its flesh less delicate. When it has attained the age of four months, it is perhaps sold to the butcher, who bleeds it once or twice before it is killed, sometimes so copiously that the poor animal falls down through weakness, and sometimes dies during the night, owing to mere exhaustion. Should it survive, it is in due time pulled up by a rope tied to the hinder legs, and the fatal knife applied. Sometimes the last ceremony is preceded by a stunning blow on the head. The bleeding is performed by tying a rope pretty tightly round the neck, and opening the vein: the bleeding is stopped by removing the ligature, and running a pin through the two edges of the wound to keep them together. Let the lovers of white veal contemplate this treatment of the poor animal: let them remember that when they refuse to allow on their tables any but pale, sickly veal, they sentence the poor calf to the misery of being kept in a constant state of artificial weakness and ill health; that the butcher, to please them, will not buy a calf that has the bright and fiery eye of health; that, to bring a proper price, the eye must be dull, white, and ghastly; in fine, that the whiter the veal the more sickly was the calf. Can any one believe that such food is the best? and may we not suspect this state of the flesh to be often the cause of the disturbance of health which eating veal is sometimes known to produce?

A practice has also been adopted of rendering beef tender, by a peculiar mode of slaughtering: the ox is first stunned by a violent blow on the head with a pole-axe, which breaks a small hole in the skull, and through the hole thus made a long cane is pushed down to the spinal marrow, which produces violent convulsions, and rolling of the eyes for some moments, as if the animal suffered excruciating torture. Perhaps there is less barbarity in this mode of death than might at first appear; but if the motive of its original adoption were, as has been affirmed, to make the beef tender, the inventor was deserving of his invention.

The following is a diabolical process, quoted by Dr. Kitchiner from Wecker's "Secrets of Nature." It is entitled, "How to roast and eat a Goose alive," an achievement which rivals the famous Abyssinian feast. The goose, after being plucked, is to be surrounded by burning fuel, and cups of water are to be placed within the circle: "she is to be larded and basted; but she is to be roasted slowly. By walking about, and flying here and there, being cooped in by the fire that stops her way out, she will fall to drink the water, and cool her heart: and when she roasteth and consumes inwardly, always wet her head and heart with a wet sponge; and when you see her giddy with running, and begin to stumble, she is roasted enough. Take her up, set her before her guests, and she will cry as you cut off any part from her, and will be almost eaten up before she be dead: *it is mighty pleasant to behold!*" Well might his commentator observes, "We suppose this receipt was stolen from the kitchen of his infernal majesty: probably it might have been one of the dishes the devil ordered when he invited Nero and Caligula to a feast."

The pleasure arising from the struggles of the expiring victim about to be devoured was not confined to this candid sensualist, but was shared in common by the Romans, in many respects a most ferocious people. The red surmullet fish was prized by them, almost unboundedly, as a source of twofold gratification; for in dying it exhibits the curious phenomenon of assuming various shades of crimson and pale red alternately. Hence it was brought to table in a vase containing fresh water, in which it can live only a short time; and, having exhausted itself, and displayed all its varying beauties to the epicures already devouring it with their eyes, it was consigned to the cook. The celebrated Roman glutton, Apicius, who wrote a curious cookery book in Latin, invented, as Pliny informs us, an improved method of treating this fish, which was to kill it in a pickle, which he named *garum sociorum.** He also invented a soup made of their livers. Asinius Celer gave 8000 sesterces, (64*l*), for one fish: great indeed must have been his love of good living. Suetonius says, that three surmullets were sold for 30,000 sesterces (242*l*.). Seneca relates that a very large surmullet being presented to Tiberius Cæsar, he ordered it to be brought to the market and sold, at the same time saying, "My friends, I am much deceived unless this fish be bought by Apicius or P. Octavius." It proved that both of them bid for it; Octavius conquered, and bought it for 5000 sesterces (about 40*l*.). This fish, which Seneca describes as "mullum ingentis formæ," and thinks sufficient "aliorum gula irritare," weighed four and a half Roman pounds, which, reduced to our avoirdupois, gives as its price no less than 12l. per pound. Vast must have been the value of a surmullet taken in the Red Sea, which, as Pliny declares, weighed 80 Roman pounds. The usual weight was two pounds; and Martial speaks of one weighing four pounds as the pride of the table. Such sacrifices border on insanity.

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* Of this pickle, or sauce, we find an account in Seneca, which is not calculated to excite much longings —"What! do you not believe that this garum sociorum, the precious putrescent runnings from stale fishes (malorum piscium saniem) burns the inward parts with its wasting saltness? Do you judge that such corruption, swallowed, as it were, out of the fire, can be extinguished in the viscera without injury?"—*Epist* 95.

It is recorded of a person of modern times, who seems to have made some improvements in the art of torturing, that having, like the Romans, a great relish for fish in its freshest state, he contrived to place a caldron of water, kept boiling, beside a salmon-leap, so that the salmon, on making its spring, might fall into the caldron.

Some of our processes for loading fowls with tender flesh and fat beyond what is natural to them is to the full as scandalous as most of the foregoing acts of cruelty. Various modes are resorted to; such as preventing all exercise, by confining the fowl in a box, just its own size, with the head and tail projecting, and cramming it with enormous quantities of food; or nailing it to a board with the same intention. Or forcing liquid food down by means of a pump, or blinding them. This last method was known in ancient times. It is said by Plutarch to have been practised by the Romans. The crane was a delicacy amongst the gluttons of elevated rank: but as the unfortunate bird was not by nature sufficiently sapid for their pampered appetite, to the cravings of which the world's limits were the only bounds, they contrived the diabolical device of putting out the unhappy captive's eyes, and cooping it. The loss of one sense rendered it necessary that another should supply the gratification of both; and the devoted victim, by overfeeding, and restraint from exercise, soon became so fat as to render it worthy of a place at the table of its rapacious tormentor. In our times, and in civilised Britain, there are not wanting persons who perpetrate as black a deed. Our pretty songster, the linnet, is capable of a sweeter and more melancholy song, when its intercourse with the external world is for ever cut off — an intercourse which this remarkably social little bird is known to enjoy with a singular zest. To do this effectually, the bird-catchers have recourse to the detestable expedient of searing the little warbler's eyes, with a red-hot wire, and confining it in a cage, so small that it has little difficulty in groping out its food. Those who can enjoy the song of the sightless musician must be incongruous compounds of human and demoniac nature.

We of modern times, however, have not to answer for the crime of inventing the cramming of fowl. We are told by Pliny, that the practice commenced in the island of Delos, and was thence imported into Rome. He says, that the consul Fannius issued an express prohibition against bringing to table any fowl but one hen, and it not crammed. However, in those days, as in the present, the public edicts were often so imperfectly constructed, that evasions became easy: they began to cram cocks and capons; for the edict only prohibited hens and pullets. Pliny further says, that the first person who practised the fattening of fowls, by confining them in small coops, was a gentleman of Rome named M. Lenius Strabo. Cornelius Nepos says, that, a little before his time, men began to cram blackbirds and thrushes in coops. Barbarian indeed must be the nation that could find no other amusement in these interesting and beautiful creatures than inflicting prolonged sufferings to render their little bodies more exciting to the palate of a glutton. Pliny declares, that M. Aufidius Lurco discovered a mode of fattening peacocks for the table, by which he derived an income of 60,000 sesterces. The first that ever served them up to table was Hortensius, the celebrated orator, at a solemn feast given when he was consecrated high-priest.

The method of producing diseased livers in poultry, disgusting as the idea may be, is eagerly practised in the present day. There are several inventions of this kind; but the following affords the acme of perfection in the art. It appears that it is a French discovery, and it has been dictated to us in the following unfeeling terms: — "The liver of a duck or goose, who has submitted to the rules and orders that men of taste have invented for the amusement of his sebaceous glands, is a superlative exquisite to the palate of a Parisian epicure. But, alas! the poor goose, to produce this darling dainty, must endure sad torments. He must be crammed with meat, deprived of drink, and kept constantly before a hot fire, — a miserable martyrdom, indeed! — and would be truly intolerable if his reflections on the consequences of his sufferings did not afford him some consolation. But the glorious prospect of the delightful growth of his liver gives him courage and support; and when he thinks how speedily it will become almost as big as his body, how high it will rank on the list of double relishes, and with what ecstasies it will be eaten by the fanciers, '*des Foies gras*,' he submits to his destiny without a sigh. The famous Strasbourg pies are made with livers thus prepared, and sell for an enormous price."

The tyrant Æmylius Censorinus, cruel as he was himself, rewarded Paterculus, the inventor of a detestable mode of torture, by making him its first victim; such, also, should have been the doom of the inventor of this method of prolonging the miseries of these wretched birds, for the sake of one minute's indulgence in a disgusting piece of epicurism.

So pampered is appetite during the prosperity of nations, and in what are called civilised countries, that the multitudinous animals within reach are insufficient to gratify the palate through all its whimsicalities. Fatigued with the variety of gratifications, the epicure seeks after something unnatural; and subjects the miserable creatures placed under his control to processes as shocking to humanity in the perpetration, as they are deceptive and mistaken in the results. Some vile pander to the basest propensities of man contrived a mode of making pork tender by the demoniacal process of whipping the animal to death. And, as equal value is often set on qualities diametrically opposite, it was, by some other person of the same stamp, imagined that the toughness of brawn could be communicated to the meat by keeping the pig always standing. It is almost unnecessary to observe, that, by neither of these processes can the object be accomplished; and it would be a pity if such practices could have any other result than failure. What tortures have these ignorant whims occasioned! It is observed by Boerhaave, in treating of poisons, that "to teach the arts of cruelty is equivalent to committing them;" I shall, therefore, suppress some other valuable secrets of a similar description.

In the early stages of society, man, pinched by hunger, is satisfied with the bare necessaries of life: he is a hunter, because he has no other means of preserving his existence. But in the 19th century, amidst profusion and variety, man is a hunter through choice. It is his taste: he pursues the fugitive animal, sinking through fatigue and terror, exults in the devices of its failing faculties, and triumphs in its miserable death, merely to gratify an inexplicable passion for a mean conquest, in which the dog and the horse have achieved the victory that man falsely appropriates to himself. Let him who denies the justice of this censure reflect on the nature of the *sports* in which some men are accustomed to indulge their destructive propensities. Let him contemplate the scene so often displayed of men, horses, and dogs, intoxicated with the same insane enthusiasm, pursuing a diminutive, unoffending creature: the only reward of this dangerous career being the enjoyment of witnessing its unsuccessful efforts to preserve existence; and of devouring the few morsels of flesh, now possessing an unnatural flavour from the chase, which its exhausted body can afford. Let him consider bull-fighting, cock-fighting, bear-baiting, badger-baiting, hawking, fowling, coursing, angling, and the many other ways in which the most exquisite tortures of the lower animals and their destruction are made to contribute to the *diversion* of men; and then decide whether such pursuits tend most to the exaltation or debasement of his species. The following anecdote excites detestation in the minds of all men, by the magnitude of the scale on which cruelty was perpetrated; yet the atrocities of our sportsmen are to the full as great, notwithstanding the complacency with which they are viewed by society. At a great hunting match, if so cowardly a sport could be so called, the sophi of Persia, his lords, and some ambassadors, caused sixty-two wild asses to be forced into an enclosure, where they were shot at with arrows. The wretched animals, deprived of the means of escape, were soon stuck thick with arrows, and afforded infinite amusement to these exalted personages by running against each other, and thereby forcing the arrows in farther. They were at length ordered to be killed and sent to the king's kitchen, their flesh being in great esteem amongst the Persians, although not possessed of the highest relish unless seasoned by cruelty.*

The celebrated tower of Ispahan was constructed with the horns of 2000 stags, killed at a hunting match by the Schah Tamas: a monument of this monster's ferocity and prodigality of blood.

The epicurism and cruelty (for they are concomitants) of the ancients was, it must be confessed, exercised on a scale which fortunately finds no parallel in the efforts of modern sensualists. Vitellius and Heliogabalus, who have rendered themselves detestable to all posterity by their cruelty and voluptuousness, enumerated in their list of delicacies a dish composed of the tongues and brains of peacocks: the former miscreant actually fed his hogs with their bodies. It is painful to think of the multitude of these beautiful birds which must have been sacrificed to glut the appetite of these human monsters and their guests, with so diminutive a morsel as each head would afford. Heliogabalus, having exhausted the ordinary bills of fare, was obliged to have recourse to articles of food, in the procuring of which there was great difficulty and expense, or the supply of which was so limited as to place them beyond the reach of other men. The finest fish had no attractions for him if not procured at such a distance as rendered it inaccessible to almost every one else. The combs torn from live cocks were to him a dish of exquisite relish, because seasoned with cruelty. (*Lampridius.*) The heads of parrots were served up at his banquets in profusion. He even made epicures of his lions and other animals, by feeding them with parrots and pheasants; and his dogs gormandised on the livers of geese. Nay, it is affirmed, that he fed his wild beasts with human beings whom he had invited to be his guests. Can there be a doubt of the insanity of a monster capable of such acts? — who, in a solemn ceremony, married the sun to the moon; pretending himself a woman, married a man; placed his grandmother on the throne; created a senate of old women; made a consul of his horse; and murdered the only true friend he had in the world?

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* Travels of the Duke of Holstein's Ambassadors.

The atrocities and excesses of the Roman emperors seem to have arisen from a methodic madness, arising from the habitual exercise of inordinate power uncontrolled by any restraint, human or divine. Valentinian kept two bears, which he fed with human beings thrown alive into their cell. Caligula was much captivated with the pastime of feeding wild beasts with human victims. When he had not criminals sufficient for his sport, it is said that he used to order any unlucky spectator to be thrown in, cutting out his tongue if he did not silently submit. Heliogabalus made plebeians sit elevated on seats inflated with air, which being suddenly discharged, let the persons fall to the ground; and there they were immediately attacked by wild beasts. The nation that endured such inflictions was deserving of such monarchs; and there seems no alternative, but to believe, that these monsters were mischievously insane, or, that their historians are unworthy of credit. We are, therefore, not to be surprised at the cruelty perpetrated by such beings on the lower animals.

Vitellius found it too severe a tax on his forbearance to await the return of appetite at the usual periods; he therefore obviated the inconsiderateness of nature by the expedient of frequent emetics. The royal example was followed by many of his admiring subjects. Nay, it was a practice with the ladies of rank to indulge in an ample potation of wine before supper, and then to relieve their stomachs by an emetic, as a whet for appetite. The emperor had a large silver dish, the filling of which, for one of his entertainments, occasioned wholesale slaughter; his excerpts being insignificant parts of various small and rare birds and fishes.

The epicurism, cruelty, and luxury of these times were by no means confined to the imperial purple, but pervaded all ranks of society that had the means of gratifying their propensities. Vedius Pollio, a gentleman of Rome, and a favourite of Augustus Cæsar, has been immortalised by Pliny for his atrocities in this way. Being fond of lampreys, he contrived a method of giving them a flavour, which was much relished by his friends, and particularly by Augustus himself; but he kept his process secret. According to one account, it was discovered in the following manner:—One of the slaves of Pollio having broken a valuable glass at a banquet when the emperor was a guest, and foreseeing his fate, supplicated Augustus to save him from the lampreys. This extraordinary appeal exciting the curiosity of Augustus, he inquired into its meaning, and learned, with great horror, that it was the practice of his favourite, whenever one of his slaves was detected in any serious offence, to throw him into the pond as a treat for his lampreys: hence their very superior flavour. Pollio was punished merely by the breaking of all his glass, and the filling up of his ponds; a piece of forbearance on the part of Augustus which did not indicate any just appreciation of such barbarity. The main facts of this case are supported by Seneca, and made use of in his book "On Clemency."

There was one Claudius Æsopus, as Pliny narrates, a tragedian of Rome, who had a platter which was worth

600 sestertia (4843*l.*). In this, he served to table all kinds of singing and speaking birds. It may be here observed, that the extravagance of Roman banquets did not consist in the mere cost of the rare meats, but depended as much on the expense of the enormous dishes in which they were served. Drusillanus, descriptively surnamed *Rotundus*, a slave of the emperor Claudius, and treasurer under him in Spain, had a silver dish which weighed 500 lbs., and eight others, which weighed 50 lbs. each. The value of such articles is not to be estimated by the quantity of silver in them; for the fashion of the plate of the Romans was in keeping with their luxurious habits. We are told that C. Gracchus had certain vessels called dolphins, for the making of which the silversmith charged no less than 5000 sesterces (about 40*l.*) per lb. But the emperor Vitellius had a platter that cost one million sesterces (8072*l.*), for the manufacture of which, a furnace was expressly built in a field. The consul Mucianus upbraided his excess by naming these vessels *patinarum paludes*.

The necessity for dishes of enormous magnitude arose from the custom of introducing whole animals at table, such as a whole boar roasted, often stuffed with the flesh of other animals, as of wild fowl; and then it was called the Trojan boar, in allusion to the Trojan horse. The most esteemed part of the feast was served in a tripatinum, one of the dishes of which contained lampreys, the second, pike, and the third, the fish myxon. (*Pliny.*) The Romans made great use of fish: they used a vast number of different species, and obtained them at great cost and trouble from all parts. Their oysters were sometimes brought from Richborough, on the coast of Kent. Such was their love of fish in its greatest perfection, that Lucullus is said to have cut through a mountain to let in an arm of the sea into his pond, the fish of which after his death sold for three million sesterces, or 24,216*l.* (*Idem*) Nay, so exquisite was their gluttony in this respect, that some of their fish were actually fed with oysters to give them a flavour, which did not naturally belong to them. At a feast given to Vitellius by his brother Lucius, there were no less than 2000 different kinds of fish, along with 7000 birds. It is therefore not surprising, that this profligate emperor expended in returning and giving such feasts, no less a sum than seven millions British pounds during the year that Rome groaned under his sway. What myriads of animals must have rendered up their lives in that year, when 9000 were sacrificed for one supper; and what a vast number of persons must have contributed their perverted talents and misapplied labour to the supply. Well might Seneca exclaim, "Dii boni! quantum hominum unus venter exercet."

Amongst the Roman epicures, we must not neglect the celebrated Cœlius Apicius, whose work *de Opsoniis et Condimentis, sive Arte Coquinaria,* in ten books, has been the subject of much useless exposition by learned commentators of comparatively modern times. He lived about the period of the Christian era: and the following summary of his life and death is given by Seneca: — "Apicius," he says, "lived within my memory at Rome, that city from which philosophers have often been banished as corruptors of youth. Yet here, professing the science of gluttony, he infected the age, both by his precept and example. After spending in his kitchen 100,000 sestertia (807,291*l.*), after swallowing up in banquets the gifts of princes, and the immense revenue of the Capitol, he found himself in debt, and *no more than* 10,000 sestertia (80,729*l.*) remaining. Fearing that if he outlived this sum he was likely to starve, he terminated his life by a dose of poison, the most salutary draught for him that ever he swallowed." (*Consol. ad Helv.*) Whoever wishes to obtain an insight into Roman cookery, should apply to the book of Apicius. In it he will have but a small quantity of matter to read (its chief perfection), although much difficulty to encounter: the language is affectedly succinct, the directions obscurely concise, and in the short compass of a few lines, will be found a heavy draft on the purse, employment of a dozen cooks, and the death-warrant of many an animal, in order to make out one dish of small and delicate excerpts from the neglected mass of devoted bodies.

The following is a specimen of one of his moderately elaborated dishes, as well as of his style; it is a mince which he calls *minutal Apicianum*, or, Apicius's mince. "Oleum, liquamen (a kind of garum made from certain kinds of fish by a tedious process), vinum, porrum capitatum, mentham, pisciculos, isiciola minuta, testiculos caponum, glandulas porcellanas. Hæc omnia in se coquantur. Teres piper, ligusticum, coriandrum viridem vel semen. suffundis liquamen, adjicies mellis modicum, et jus de suo sibi vino et melle temperabas: facias ut ferveat: cum ferbuerit, tractam confringes, obligas, coagitas, piper asperges, et inferes."* To make up a small dish of this kind, would require the death of at least three or four dozen animals.

Pliny denounces this arch-glutton as the first who taught men that the tongue of the bird named phœnicopterus, supposed to be the flamingo, is a most delicious morsel. The tongue of this poor bird has been the cause of its misfortunes, and the flamingo has ever fallen a victim to the pretended discovery of this sensualist, although modern taste by no means agrees in the panegyric. Apicius says nothing in his book, "de Arte Coquinaria" of the tongues; but he gives a formula for cooking the bird itself, and recommends the same to be used with parrots. We learn from this work that the taste of the Romans, with respect to cookery, was very different indeed from that which now prevails in Great Britain; and it is pretty certain, that one of Apicius's most elaborately medicated dishes, for the inordinate use of herbs and spices warrants the phrase, would be partaken of with great reserve, and some doubtful smackings of the lips, by one of our modern epicures. Caution of this kind might not be misplaced; for we have it on the authority of La Bleterie, that Madame Dacier, and her husband, were almost killed by dining on a classical ragout, cooked according to one of the formulæ of Apicius.

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* Apicii lib iv. c iii.

The excesses of the ancient voluptuaries, notwithstanding the lash of the satirists, seem to have been not always considered as offences against public decency, or to have been deprecated as matter of public scandal. On the contrary, it appears from the testimony of Ælian, that in Sicily, there was actually a temple dedicated to gluttony, adorned with a statue of Ceres: and he gives a stupid and absurd account of a number of votaries of this vice. He declares, that at the feasts of Bacchus, a pension was awarded to the person that could drink the most. And, as a specimen of an accomplished and devoted glutton, he adduces Smyndiridas, the Sybarite, who, on his return from his journey to Sicyon, brought with him from thence 1000 cooks, 1000 fowlers, and 1000 fishers! Archestratus, an epicurean, was not ashamed to prostitute his talents by writing a poem in praise of gluttony.

The Greeks, who had every night to provide a supper for Xerxes during his expedition against their country, were reduced, in consequence of the expense, to such extreme misery, that they were obliged to abandon their homes. Antipater, a Thracian citizen, declared, that 400 talents of silver had been expended on a single repast. These suppers were prepared in the different cities through which Xerxes and his army passed: they were for the king and his table companions only. On this occasion, Megacreon advised the people of Abdera heartily to thank the gods that it was not the custom of Xerxes to take two meals a day: for had they to provide a dinner as well as a supper they must have been altogether ruined. (*Diod. Siculus.*)

How humiliating and dependent is the condition of the man who indulges in habitual epicurism and gluttony. How much more to be respected is the life of the person who receives the gifts of Providence as they are dispensed, with only such preparation as nature requires and is warrantable to render his food a reasonable enjoyment. Let the luxurious learn the pleasure and independence of frugality, and profit by the instructive story of the virtuous Gnephacthus, a king of ancient Egypt, which is preserved by Diodorus Siculus. While this monarch was conducting his troops through the desert plains of Arabia, his provisions failed, and he was himself obliged to be satisfied with such coarse fare as the peasants could supply. Hunger sweetened his repast: he ate heartily, and relished his meal with such a zest, that, struck with the independence conferred on him by being contented with simple food, he forbade for the future all excess, and cursed king Menas, who first introduced luxury. So captivated was he with plain diet and mean accommodations, that he caused this denunciation to be registered amongst the sacred records in the temple of Jupiter, at Thebes; and from that time the reputation of Menas declined.

The subject of epicurism and luxury has occupied the attention of several virtuous governments in ancient and modern times, with the view of checking inordinate expenditure on the pleasures of the table, on vain display in domestic appointments, and on dress Sumptuary laws, however, never effected any good purpose; and, in the present day, reliance is placed on the self-curative tendency of all great moral evils. The *Fannia lex*, and *Licinia lex*, amongst the Romans, actually restricted the quantity of fresh and salt meat that was to be used on ordinary days, and at entertainments, as well as the maximum sum of money that was to be expended. And truth to say the profligate luxury of the Romans could scarcely be passed unheeded by the consular power, which was absolute, and was often exerted with inquisitorial watchfulness. Julius Cæsar, whose sensualities were not those of the board, enforced the sumptuary laws with great rigour. He placed inspectors in the market-places, whose duty it was to seize forbidden articles of food. He also sent lictors and soldiers into private houses to remove anything that might have escaped the notice of his inspectors, even from the dinner tables. (*Suetonii J. Cæsar.*)

Ridicule has been found to do more in this respect than legislation and punishments: hence the efforts of Juvenal, Persius, and Horace. There was a remarkable and witty legislative contrivance, founded on this principle, promulgated by Zaleucus the Locrian lawgiver, which restrained, without inordinately interfering with the principle of free-agency. To correct the sumptuousness of the fair sex, he decreed that no lady, free of the city of Locris, should be attended by more than one servant, unless she was intoxicated: that ladies should not walk abroad at night, or wear golden ornaments, or garments embroidered with gold, unless with a scandalous intention: and, that no man should wear a gold ring or a Milesian garment, unless he acknowledged himself guilty of adultery. (*Diod. Siculus.*)

The Lacedæmonians actually made a law against corpulency; fat and much flesh being in their opinion mere burthens to the bones, and impairing a man's activity and capability of serving the state. Ælian reports that the Lacedæmonians perceiving Nauclides to be extremely fat, the result of his idleness and sensuality, were much offended: and, in order to make an example of him, they led him through an assembly of people, where he was universally stared at as a natural phenomenon. They also threatened to punish him with expulsion out of the city, if he did not relinquish his gluttonous mode of life, and thus reduce his dimensions something nearer the standard of a man.

Among the same virtuous people, cooks and butchers, as persons absolutely necessary, were tolerated by the laws; but no other kind of victuallers would be permitted in Lacedæmonia: and if any such were discovered, they were banished as useless and detrimental excrescences. (*Ælian.*)

In Great Britain, many attempts were made in former times to restrain the people within the bounds of moderation. The nobility were enjoined on ordinary occasions to permit but two courses at dinner or supper, each course consisting of but two different dishes. On great festival days, three courses might be admitted. The use of baked meat was once prohibited to all persons under the rank of gentlemen, and to these only on festival days. In France, no one was permitted to bring on his table more than one soup and two dishes. In modern times, our legislators do not find such restrictions convenient, and perhaps their convictions are against their utility. The present inordinate use of wines and other spirituous liquors is certainly worthy of attention.

Excessive indulgence in the pleasures of the table does not produce its effects suddenly, yet it gives almost immediate warning after each transgression. The oppressive fulness, the prostration of intellectual vigour, the disqualification from all corporal duties, the disturbance during sleep by terrific dreams, the unrefreshed and feverish weariness experienced on awaking, are immediate consequence of even one day's indulgence. What must be the accumulated effects of daily reiteration? The answer will be found by reference to the unwieldy body, the laborious gait, the inaptitude for exertion, the purple face, suffused eyes, and disrelish for every other enjoyment which characterise the latter years of the gourmand, until a sudden break down indicates that the machinery has been over-wrought, and will no longer work: — "innumerabiles esse morbos miraris? coquos numera:" said Seneca..

There can be but little doubt that most people indulge in the use of a greater quantity of food than is conducive to perfect health; for it is worth observing how little will supply the real necessities of nature. Dr. Goldsmith observes: "it is surprising to what a great age the primitive Christians of the East, who retired from persecution in the deserts of Arabia, continued to live, in all the bloom of health, and yet all the rigours of abstemious discipline. Their common allowance, as we are told, for four and twenty hours, was twelve ounces of bread, and nothing but water. On this simple beverage St. Anthony is said to have lived 105 years; James the hermit 104; Arsenius, tutor to the emperor Arcadius 120, St. Epiphanius 115; Simeon 112; and Rombald 120. In this manner did these holy temperate men live to an extreme old age, kept cheerful by strong hopes, and healthful by moderate labour." Charles XII. of Sweden, we are told by Voltaire, hearing that a certain woman had fasted for three months, wished to ascertain how long a human being could really dispense with nourishment. He actually for five days abstained totally from eating or drinking: on the sixth day he rode two leagues, and then ate heartily, *not in the least degree incommoded.* Menedemus the Eretrian philosopher died on the seventh day, by starvation; and Drusus, starved to death by Tiberius, was found dead on the ninth day. Yet there is an instance of four men shut up in a mine, who actually survived deprivation of all sustenance, except water, for 24 days.*

From consideration of such facts we can form some judgment whether nature requires, in the 24 hours, a hearty breakfast with eggs or meat; a luncheon perhaps also of meat; a dinner of meat, vegetables, ale, and wine; tea or coffee with cakes; and perhaps a supper with meat. Yet all this is achieved by some persons, and the little time that such employment leaves unoccupied is devoted perhaps to resting on a couch, until the digestive organs have recovered the fatigue. Let us therefore be the less surprised at the performances of such men as Herodotus the wrestler of Thebes, who, being six feet and a half high, and accustomed to violent exercise, throve well on the daily allowance of 20 pounds of meat; or the ferocious emperor Maximinus, eight feet high, and the most powerful and active man of that or perhaps any succeeding age, who consumed just twice as much meat as Herodotus, along with the very sufficient allowance of 18 bottles of wine per diem. These statements seem a little apocryphal, although supported by history: but if so, what are we to think of Aglais, a lady, who, as Ælian reports, consumed at a meal 12 pounds of meat, as much bread as two bushels of wheat could make, and three gallons of wine.

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* Phil Trans. 1684.

Amongst the religious institutions of many countries, although unilluminated by the light of Christianity, we find a humane policy adopted for the protection of animals, against the cruelty and destructiveness of man, which, as a matter of human contrivance, commands our admiration of the motives which suggested it.

Amongst the ancient Egyptians, humanity to animals seems to have been a striking trait of national character; it being ennobled into a sacred duty to their gods. Herodotus informs us that the few wild animals found in Egypt were held sacred, and that there were persons who were appointed guardians of the several species, and that this office was hereditary. He who intentionally killed one of these animals, paid the forfeit of his life: if unintentionally, he was mulcted in a fine. But whoever killed an ibis, whether intentionally or otherwise, he was sure to suffer death: for it was this bird that was supposed to devour the flying serpents, during their fancied passage from Arabia towards Egypt; and hence was entitled to the gratitude of the nation. This primitive people piously interred the bodies of cats, dogs, ichneumons, bears, and wolves.

So much valued are the lives and comfort of the inferior animals by the Hindoos, who are believers in the doctrine of transmigration, that they have hospitals for their support and comfort, in various places. In the city of Cambay, as we are informed by Dubois, there were three hospitals, one for birds, another for goats, and another for black cattle. In the city of Surat there is an extensive hospital, endowed with an ample income, and filled with all sorts of invalid domestic animals, which have the attendance of a physician. We smile at those exquisite manifestations of the finer feelings of humanity. These people have what we would designate a morbid respect for animal life: we Europeans certainly do not fall into that extreme. However, a little intermixture of Hindoo humanity and respect of life in our practices, would doubtless improve us. It is recorded that some European settlers of North America, in the short space of two years, slaughtered 700 noble buffaloes, for the paltry object of their skins, which they sold for two shillings each, leaving the carcasses for wild beasts! And in the same country thousands of them have been destroyed, merely for the sake of their tongues, which happen to be an American epicure's delicacy. Such are the actions of men claiming to themselves, on the credit of their country, a high degree of civilisation. Do not such actions place the perpetrator on the same level with the savage Hottentot, who slaughters the beautiful giraffe for the marrow of his bones, and the huge rhinoceros for the soles of his feet, which, to be rendered sufficiently delicate, must be broiled amongst the burning bodies of some thousand ants, incinerated in their own nests.

In the code of Buddha, the killing of even the meanest animal is strictly prohibited, and any superadded cruelty is denounced with a vindictiveness towards man, which excites our wonder at so strange a compound of humanity to one animal and cruelty to another. According to this creed, those who ensnare fish, will be torn with red-hot hooks for 1000 infernal years, one day of the infernal year being equal to 1000 terrestrial years. Hunters, and those who kill oxen, swine, and goats, are to be ground for 2000 infernal years. Those who throw animals into boiling water shall swallow fire, and have their intestines burnt by it for 4000 infernal years. Those who kill and feed on hogs and deer, or spread nets, shall be rolled headlong into hell, and caught on an iron spit, on which demons shall hew and hack them for 1600 infernal years.* Although the absurdity and disproportionateness of these denunciations may excite a smile, the good feeling for the lower animals which dictated them, cannot fail to call forth admiration. And were a little of the merciful intentions of the contriver infused into the practices of civilised society, the character and value of civilisation itself would be enhanced. The priests of Pegu — ministers of idolatry — taught that as charity is the most sublime of all virtues, it ought to be extended not only to mankind but to the inferior animals.

This chapter may be concluded by a summary of the opinions which it has been our object to support. Food and drink ought to be used as necessaries, not luxuries; as moderate enjoyments, not all absorbing pursuits, as a means of sustaining life, not of endangering health. Since the lot of the inferior animals renders them subject to man, cruelty ought not to be added to death: and as life must be sacrificed, it should be done with the least possible suffering. Let modes of death be invented in order to spare the animal's pain, not to impart a flavour to its flesh. Let it be kept in mind, that the most worthless and oppressive burthen on God's creatures is the man whose chief source of enjoyment is his palate, to gratify which he is prodigal of life and regardless of suffering. and that he who is an epicure is the cause of cruelty, and is thus implicated in his own and another's sin:

> Per ia dannosa colpa della gola,
> Come tu vedi, alla pioggia mi fiacco.
> Ed io, anima trista, non son sola,
> Che tutte queste a simil pena stanno,
> Per simil colpa!

So wrote the poet who classified human offences and punishments, and placed the epicure in the third circle of the infernal regions, amidst eternal rain, hail, and snow.

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* See an excellent account of Budd'hism, in Encyclop. Metrop.

CHAP. II.

GENERAL OBSERVATIONS ON THE ANIMAL FOOD OF DIFFERENT NATIONS.

There is scarcely an animal, however repugnant to the prejudices of Europeans, that is not employed as food by one of the nations of the globe or another. Appetite, and the absence of other food, sweeten every diet; and the quadruped, the bird, the fish, the reptile, and the vilest insect have their admirers. Many of these are contemplated in civilised countries with disgust. But let the philosophic reader recollect that these nauseating sensations arise out of erroneous habits of appreciation. Who that does not judge from experience can decide between a serpent and an eel, as articles of food? Who that has not tried both can affirm whether the flesh of a cat is less delicate than that of a rabbit, for which it is said to be not unfrequently substituted in certain countries? The unclean food and habits of some animals, may be assigned as a cause of the aversion felt to them as articles of sustenance. But such an objection can only be founded on the false assumption, that food is assimilated by the animal economy without change, — that what the animal feeds on becomes a part of itself, retaining its original nature. It should be remembered that the elements of all things are few, and identical throughout their diversified forms: that the most revolting reptile is composed of the same oxygen, hydrogen, carbon, and azote, which enter into the composition of the ortolan, the turtle, or any of our most delicious morsels: and that the flesh of the animal on which we feed is composed of the same materials, whether its sustenance be drawn from the most delicate or the most disgusting sources. Taking the matter in this point of view, it is plain that, beyond taste or caprice, there are no grounds for preferring one kind of flesh to another: and that the food on which the animal subsisted avails nothing, unless with reference to flavour, or some other dispensable or perhaps disputable quality of its flesh. In Norway, a highly civilised country, a practice prevails which in England would be contemplated with unqualified reprobation. It is customary during the severe season of the year, to feed cows, pigs, and sheep, which are afterwards to constitute the sustenance of their proprietors, with the stercora obtained from the stables of their horses, either in that state or boiled with meal. The meat, however, is in no way affected.

These considerations evince that the difference of taste in food, which subsists between civilised and barbarous nations, ought not to be allowed to excite those feelings of disgust, amounting often to antipathy, which the former are apt to entertain against the poor savage who, disciplined by imperious necessity, prefers sustaining existence by any means within his reach, rather than surrender it, because he is a stranger to the luxuries and abundance of a more happy quarter of the globe. The same considerations may perhaps reconcile the reader to some of the succeeding details, which otherwise he might pronounce an unwarrantable trial of the strength of his stomach; but which, as a reasonable being, he is bound to consider as mere facts in the history of his fellow creature, and as a cause of gratitude to his Maker that he has been placed under circumstances which permit his palate to be so fastidious.

Besides these considerations, there are others that ought, in cases of difference of taste, to render us more cautious in deciding against those whose practices vary from our own. An article of food which in one country is excellent, may in another, owing to difference of climate and other causes, be inferior: and of this many instances might be adduced, — a few will suffice. The domestic poultry of England are juicy and full of flavour, those of the coast of Guinea are dry and lean: yet the latter brought to England soon become an admirable addition to the farm-yard. The pheasant in England is a dainty, in Surat it is poor and bad meat. In the country round the harbour of Chequetan, Anson found these birds remarkably large, but they were tasteless; so indeed were all the other birds. Lieutenant Paterson found the wild-ducks in the country of the Hottentot, so oily that they were quite disagreeable as food. On the coast of Guinea they have a small breed of sheep, the flesh of which is dry and disagreeable: no remark need be made on the flavour of mutton in Great Britain. In Persia and Tartary, the sheep are large and good; but in the south of Hindoostan their flesh is comparatively lean and dry. In Britain the goat is considered strong, dry, and inferior food; in the island of Juan Fernandez captain Rogers found it less rank: on the coast of Guinea, it degenerates in size, but improves in fat and flesh. In some countries goat's-flesh ranks with venison. Again: the hogs of China afford a meat that is prized more than any other, and is said to be far superior to European pork. The beef of Great Britain is proverbially excellent; in equatorial regions it is far less juicy and tender.

But the most independent footing to place the preference given by some nations to diet, which to others might appear unnatural and disgusting, is the consideration that wholesomeness is the only true criterion to which reference can be made; and that all other grounds of choice exist in habit, imagination, ignorance, or prejudice. A European can assign as little reason for his relish of beef, and his disgust to the dainties of the Greenlander, as the latter can for the zest with which he devours his blubber. All that either person considers or need consider, beyond the wholesomeness of the food, is that it pleases his palate; and neither ought to decide that his choice is in any respect better founded.

This being the case, and duly appreciated, we may proceed with more reliance on the forbearance of the reader, while we adduce some instances of the difference of taste which exists between different nations of the globe; and with more security that the relation which a full and faithful history renders necessary, will in no degree tend to subvert the equilibrium of his stomach.

The name Esquimaux is derived from an Indian word that signifies an eater of raw fish (*Forster*), to which is added a French termination. When going to fish, these people take in their boats a bladder full of train oil, as others take a dram-bottle; and seem to drink the contents with the same relish. (*Ellis.*) The oil thus freely swallowed would be considered in the British isles too ill-smelling to be burned in a lamp. Melted fat, swallowed by itself, is also a favourite amongst the Arctic nations. Blubber of seals is much valued, and the flesh is their chief support. a Kamtschadale "entertains his guests by cramming into their mouths fat slices of a seal or whale, cutting off with his knife what hangs out." (*Lord Kames.*) The Laplanders compose a soup, which they consider very delicate, by boiling bruised bark of fir-tree, reindeer tallow, and water together. In the Society Isles, they strangle dogs, and the extravasated blood of the neck is baked in cocoa-shells, for a first-rate delicacy. The stercora of the musk-ox, as well as of the rein-deer, are highly prized by the Esquimaux.*

The Greenlanders frequently eat the flesh of their reindeer raw, either fresh or dried; and after this meal they quench their thirst with the warm blood, or, for occasional variety, with seal's blood. The raw intestines of the white partridge are particularly to their liking: and the raw stomach and intestines of the white hare, with their contents, are equally esteemed, although the flesh, being too simple in its flavour, is despised. Yet so superstitious are those who feast upon this garbage that they will by no means touch the flesh of the raven. The contents of the stomach of the reindeer constitute another favourite dish, which obtains with them the euphonious title of *nerikak*.† The same delicacy is in high estimation amongst the natives of Boothia Fœlix, and its name is nearly similar, *ner-rook-kah*. This half-digested food in the stomach of the rein-deer, is the only vegetable aliment which these people ever taste.* The Indians, inhabiting the coasts within Hudson's Straits, also consider this disgusting substance a banquet: they eat it sometimes raw, sometimes boiled along with the blood of the animal. Capt. Lyon, induced by motives of prudence, tasted it while in company with a party of Esquimaux: he says, "I found this substance acid, and rather pungent, resembling, as near as I could judge, a mixture of sorrel and radish leaves. I conceive that the acidity recommends it to these people."† Many of the Indians and Canadian voyagers prefer this savoury mixture after it has undergone fermentation for a few days, which they call seasoning. The whole carcase of the reindeer is eaten by these Indians in one shape or another, even to parts of the horns. The hunter breaks the leg-bones of the recently slaughtered animal, and whilst the marrow is still warm greedily devours it. Portions of the intestines are occasionally eaten raw. In the spring, when the larvæ of the *œstrus*, which are lodged in the fauces and nostrils, have attained a large size, these parts of the animal are considered as choice morsels by Indian epicures.‡

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* Second Voyage of Capt Ross. † Giesecke Brewster's Enc.

Another favourite repast of the Indians inhabiting the country about Hudson's Bay, is composed of blood, mixed with the half-digested food found in the deer's stomach, and boiled with a sufficiency of water to make it the consistence of pease-pottage. Some fat, and tender scraps of flesh are also boiled with it. To render this dish more palatable, they mix the blood with the contents of the stomach in the stomach itself, and hang it in the heat and smoke of the fire for several days, which makes it ferment and "gives it (says Mr. Hearne) such an agreeable acid taste, that were it not for prejudice, it might be eaten by those who have the nicest palates." Some, he thinks (and the reader will agree with him), might object if they saw the cookery, "for the most part of the fat which is boiled in it is first chewed by men and boys in order to break the globules that contain the fat." But, as he found that old people and bad teeth were precluded from this duty, he says, "I no longer made any scruple, but always thought it exceedingly good."*

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* Ross's Second Voyage † Parry's Second Voyage. ‡ Idem.

So great a dainty are the contents of the stomach considered, that it is not always impatience can be restrained long enough to permit the delay of boiling this pultaceous mass: it is frequently devoured warm, as soon as it can be taken from the slaughtered animal, provided the deer had fed upon white moss. They also immediately extract the kidneys and eat them raw, while still warm. The blood is not allowed to go to waste, but is drunk as it flows from the wound; for it is deemed not only an excellent quencher of thirst, but a highly nourishing beverage. The fœtus in utero of the buffalo, elk, and deer, with the organ itself, and its external appendages, constitute another of their delicacies; the whole apparatus, is devoured, even without washing. Sometimes it is previously smoked. Europeans have even partaken of this abominable dish. (*Hearne.*)

M. René Caillié says, that at Timé, (Central Africa) some Mandingoes killed a kid, and taking out the stomach, "put it on the fire, and broiled it without taking the trouble to wash it." They then shared and devoured it. The Arabians take the contents of the stomach of the ostrich, a disgusting mixture of half digested food, blood, and fat, and make an exquisite dish of it.

Jonas Hanway (*Travels*) informs us that certain Calmuck Tartars, residing near the banks of the Volga, fed on the entrails of horses, camels, dromedaries, and other animals, even when they died of the foulest distempers. They threw the dead bodies of their fellow-creatures into the open fields, and kept dogs for the purpose of devouring them. Thus they made the dead contribute to the living, for dogs were an article of food used by this filthy people. The Hottentots also eat the entrails of their cattle, some say, not previously washed from the feces, but Kolben affirms that they do cleanse them. The Roman lovers of dainties ate the entrails of a certain fish, and made it a point not to clear them of their contents. About three centuries ago the entrails of a salmon with various spices, milk, oil, and almonds, were a great favourite in England. The Romans made a kind of sauce which they called *garum* from the fish *garos*; it was a putrid liquor obtained from the salted entrails: it was one of their most precious condiments, and Pliny says bore a higher price than any thing except cosmetic ointments.

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* Hearne's Jonrney, p 316.

Putrescency is no blemish, in the opinion of many nations. The Esquimaux and Greenlanders enjoy their meal of seal's flesh, notwithstanding its being pretty far advanced. The inhabitants of Terra del Fuego find the putrid flesh of the whale and seal quite agreeable. They are but little solicitous about their mode of cookery, or whether there be any cookery at all used with their food, for they will take a fish out of the water alive, and devour it piecemeal while it struggles under the teeth. This is bad enough, but after all is not much worse than our own practice of opening an oyster, tearing the fish from its adhesions, and swallowing it still alive; or of those who venture to let into their stomach that ugly little fish the loche, after a momentary immersion in wine, and while it is half alive. An Icelander will not sit down to dine on his shark or sun-fish unless it is rendered tender by putrefaction; and the case is much the same with our own epicures, who do not relish their wild-fowl, their venison, or even their mutton, unless it has undergone the first stage, or, perhaps, has become distinguishable by its effects on the olfactory nerves; to allay which piquancy, acid condiments become necessary. Paterson assures us that a certain tribe of Hottentots, "when it happens that a grampus is cast ashore, will remove their huts to the place, and subsist upon it as long as any part remains; and in this manner it sometimes affords sustenance for half a year, though in a great measure decayed and putrefied by the sun.* The Chinese have no objection to a tolerable degree of putrefaction; nor are they exact as to the nature of the meat: cats, dogs, and horses, are as acceptable as any other, and it is of no consequence to them whether the animal has been slaughtered or died a natural death. Nay, cannibalism has been laid to their charge, and they are acridophagi. Such are the people that call us barbarians, and think us in all respects inferior to them. In the account of China given by the Jesuit Le Compte, it is stated that the Chinese admitted that "although the Europeans do not see so clearly as we, they have at least each of them one eye." The Greenlanders, whose habits are of the most disgustingly filthy kind, also ridicule the Europeans they consider themselves the only civilised nation; and when they intend a high compliment to an European, they say he is almost as well-bred as a Greenlander. Herodotus says that the Persians despised all nations but themselves. Perhaps exclusive self-appreciation is always a concomitant of real barbarism.

Insects have not escaped. Of locusts, notice shall be hereafter taken Mr. Jezrel Jones† tells us that the Mauritanian Moors esteemed honey a wholesome breakfast, and the most delicious that which is in the comb with the young bees in it, before they come out of their cases, and while they still look milk-white. The Hottentots devour a certain description of multipedes, not to gratify their appetite, but in revenge for past injuries,—*mordaces morsi*. The Chinese also submit these offenders to summary punishment; and such is their vindictiveness that their teeth must give audible proofs of retaliation,—*usque ad necem*. The Indians about Hudson's Bay pursue this sort of prey with the utmost avidity, and Mr. Hearne says that the produce of a garment not only affords a pleasing amusement, but a delicious repast. One of these Indians employed no less than six wives in the pursuit, and swallowed them as an European epicure would the mites in a cheese. He saw an Indian eat a whole handful of maggots produced in meat by a fly-blow.*

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* Narrative, p 116

† Phil Trans 1699

The natives of some part of Australia eat a kind of caterpillar which they find abundantly, and of which they compose a dish to them highly savoury. The Boshmans, says Mr. Sparman, eat the larvæ of insects, along with roots, berries, and plants in the raw state. The Tonquinese make a fry of the nymphæ of the silkworm, and eat the eggs of ants. The savage and naked mountaineers of Asam eat almost every living thing, amongst others, ants. So also do the Boshmans, along with grasshoppers. The natives of New Holland were a little more refined in their cookery; they mixed ants and worms with the bark of trees, and baked the mixture into cakes, which they ate with much satisfaction. The natives of King George's Sound eat the grubs of a kind of cockchafer, and eggs of ants. Worms are eaten by the people of Fezzan, of Tonquin, and of China. The natives of the country about Hudson's Bay feed on the maggots which they extract from the hides of deer, they are eaten alive, and are highly prized. They even make no concealment of being well-disposed to the secretion of the nostrils. (*Hearne.*) The ancient Phrygians and people of Pontus devoured a kind of thick white worms with black heads, and even considered them delicacies; and the Romans held in high estimation a large green worm found on oak-trees. The inhabitants of New Caledonia eat a kind of red spider found in the woods. The Boshmans also eat some sorts of spiders. The lowest grade of animal food on record is the sponge: the unfortunate crew of the St. Nicolai, wrecked on the north-west coast of America, were reduced to the extremity of eating it. Hunger will force men to relish any diet. The Norwegians mix the powdered bark of trees with meal, and bake it into cakes, which they use as food when necessity urges. But the most remarkable of all exepedients to appease the cravings of appetite is that of eating clay, which some American tribes resort to when they can obtain no better. The sable-hunters tie a board on the breast, and another on the back, as tight as will permit respiration, for the same purpose, when their provisions fail.

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* Journey, p. 325

It is the taste of some part of mankind to prefer their meat boiled or roasted. Those who do so have no right to question the taste of others who prefer it raw. The Tartars choose to eat their horseflesh reeking. At Sennaar it is the custom to eat the liver of the camel raw.

In the Faroe Islands, near as they are to the seat of civilisation, they eat lamb's flesh raw, and without any other preparation than drying. In the Marquesas Islands they eat raw pork, a diet so much the contrary of what is deemed wholesome with us, that we have an apprehension of using pork that is in the least degree underdone. The inhabitants of many countries eat their fish raw, without any cooking beyond drying, and sometimes without even this. Mr. Hearne acquired a relish for the raw brains of reindeer, and fish barely warm through. Sir John Ross relates that, having some Esquimaux to dine with him, he was much embarrassed by the difficulty of cooking for so many; but he was relieved by finding that they devoured their salmon raw, and seemed to relish it mightily, if a judgment was to be drawn from their achievements; for each of them swallowed the very sufficient quantity of fourteen pounds of this rich fish.* Sir John Ross observes it is no wonder they spend a great part of their lives in fishing. The young Esquimaux, owing to the vast quantity of food they consume, have enormously projecting stomachs. (*Umfreville.*)

Amongst the Indians of Hudson's Bay, unborn animals, as calves, fawns and beavers, are reckoned most delicate food. Mr. Hearne says, "I am not the only European who heartily joins in pronouncing them the greatest dainties that can be eaten. The same may be said of young geese, ducks, &c. in the shell." It is almost a proverb, he says, in the northern settlements, that whoever wishes to know what is good must live with the Indians.†

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* Second Voyage

† Journey, p. 318.

There is no use in pursuing this subject further: enough has been said to show that it is imprudent to ridicule the predilections or practices of nations which do not choose, or have not it in their power, to make use of such animal food as is depended on by Europeans. Tastes differ: there is no standard of taste in food; and it is variable amongst ourselves. We ridicule the Persians for eating assafœtida with their food; but this practice ought not to be reviled as disgusting or unnatural by Europeans, who indulge in eating garlic, the qualities of which are similar, and to the full as disagreeable to those unaccustomed to either. A delicate sucking pig is a treat to most persons; but king James's opinion of it was, that when he invited the devil to dinner, a roasted sucking pig should be placed before their majesties. Necessity sweetens every diet, and occasions a wonderful change in the opinions of men concerning food. During the siege of Bilboa (end of 1836) horseflesh sold for *2s. 2d.* per pound; half a cat cost *2s 2d*; a fowl one guinea; and an egg one shilling. We know that persons travelling with the caravans in parts of Asia have given 500 dollars for a draught of water. During the famine of Samaria, an ass's head sold for four-score pieces of silver.

CHAP. III.

ACCOUNT OF ANIMALS USED AS FOOD BY THE VARIOUS NATIONS OF THE WORLD.

IN treating of the several animals used as food throughout the world, it is of little consequence what classifications adopted from amongst the many that have been proposed by naturalists. Indeed, a mere enumeration would suffice, could such be attained without any classification; but enumeration implies order, order suggests relation, and relation is the basis of classification. The Linnæan system, as the most popular in this country, although in many respects objectionable, will in a modified form answer all the purposes of this volume.

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* 2 Kings, vi

Our subject is not the natural history of animals, but some peculiar applications of them to the wants of man. Yet to communicate even these with effect, it will be necessary to give a succinct sketch of the habits of such animals as are less generally known as food. To state that this or that animal is used as food by one nation or another, would prove a dry and unsatisfactory narrative, and would make but a faint impression on the memory. Something more is required to satisfy curiosity, and this the reader expects to find, without having to refer, in every instance, to a work on natural history. The habits of the animals on which man feeds; their peculiarities, size, shape, haunts, country, the mode of capture, the flavour of their flesh, the parts most prized, the mode of cookery,—naturally constitute subjects of interest to beings who more or less depend on them for existence. On these accounts, a short description of the habitudes of those that are chiefly used as food shall be given.

CLASSIFICATION.

Class I. *Mammalia.*

Order I. MAN.
  II. QUADRUMANA.
    Monkey, Ape, Baboon — Lemur — Bat.
  III. BRUTA.
    Sloth — Ant-eater — Pangolin — Earth-hog — Armadillo — Rhinoceros — Elephant — Walrus, Manatee
  IV. FERÆ.
    Seal — Dog, Wolf, Hyæna, Jackal, Fox — Lion, Tiger, Leopard, Hunting-leopard, Cat — Otter, Sea-otter, Martin, Weasel — Skunk — Bear, Badger, Raccoon, Glutton, Kangaroo — Opossum, Wombat — Hedgehog.

Order V. GLIRES.

Porcupine — Guinea-pig, Agouti — Musk Beaver, Castor Beaver — Rat, Labrador Rat, Perchal Rat, Water Rat, Musk Rat, Javan Cavy, Spotted Cavy, Maryland Marmot, Mouse, Lemming — Marmot — Squirrel — Dormouse — Jerboa. — Hare, Rabbit.

VI. PECORA.

Camel, Dromedary, Lama, Vicuna — Reindeer, Moose, Elk, Stag, Fallow Deer, Roebuck — Antelope, Neel-ghau, Chamois — Goat — Sheep — Ox, Buffalo, Bison, Gnou, Musk Ox.

VII. BELLUÆ.

Horse, Ass, Wild Ass, Zebra — Hippopotamus — Tapir — Hog, Wild Hog, Peccary.

VIII. CETE.

Narwhal — Whale — Cachalot — Porpus, Dolphin, Beluga or White Dolphin.

Class II. *Aves.*

Order I. ACCIPITRES.

II. PICÆ.

Parrot — Toucan — Rook, Jay — Roller — Cuckow

III. ANSERES.

Swan, Goose, Duck, Teal, Widgeon — Puffin, Penguin — Cormorant, Soland Goose — Gull.

IV. GRALLÆ.

Flamingo — Heron, Crane, Bittern — Curlew, Woodcock, Snipe — Plover — Landrail or Corncrake — Bustard — Ostrich.

V. GALLINÆ.

Peacock — Turkey — Domestic Cock, Pheasant — Grouse, Partridge, Quail.

VI. PASSERES.

Domestic Pigeon — Sky-lark — Starling — Thrush, Fieldfare, Common Blackbird — Stonechatter, Wheatear, Redbreast, Nightingale — Swallow.

Class III. *Amphibia.*

Order I. REPTILIA.

Turtle, Tortoise — Crocodile, Alligator, Lizard, Guana. — Frog, Toad.

II. SERPENTIA.

Boa — Rattlesnake — Viper or Adder.

Class IV. *Pisces.*

Order I. Apodes.
Eel, Conger Eel — Electrical Gymnote — Wolf-fish — Sword-fish.
II. Jugulares.
Cod, Haddock, Whiting, Whiting-Pollack, Hake, Ling, Torsk.
III. Thoracici.
John Doree — Halibut, Plaice, Sole, Turbot — Brill, Flounder — Perch — Mackerel, Tunny — Surmullet — Gurnard.
IV Abdominales.
Salmon, Salmon Trout, Trout, Smelt — Pike, Sea-Pike, Common Mullet — Herring, Pilchard, Sprat, Anchovy — Carp, Tench, Whitebait.
V. Branchiostegi.
Sturgeon.
VI. Chondropterygii.
Lamprey — Ray, Torpedo — White Shark.

Class V. *Insecta.*

Class VI. *Crustacea.*

Class VII. *Testacea.*

These seven classes of animals suggest a division of this chapter into so many sections. The last three classes contain a vast number of genera, yet supply so little to the wants of man that a subdivision of them is unnecessary.

Section I.

Class I. *Mammalia.* — Order I. Man.

It had been long doubted that human beings, neglecting those feelings of respect to the dead which seem natural to most nations, could feed on the remains of their fellow-creatures, for the mere sake of the flesh, and without having any other incentive. It was supposed that the cannibal revels in this detestable banquet to complete his triumph over a fallen enemy, or to appease the violence of vindictive fury. The truth is, however, incontrovertibly established, that without any such motive man will devour man, just as he would his ordinary food, and often with a higher relish; and that feasts of human flesh are resorted to as sources of animal gratification, without any reference to the revengeful ebullition of savage retribution. The cannibal has not only his favourite parts in the human body, but he prefers certain modes of cookery. He looks forward with pleasure to the banquet; and it has been sometimes the deliberate object of predatory warfare, in which the conflict tended less to the slaughter of enemies than to the capture of individuals, whose youth and tenderness rendered them desirable morsels for gratifying the unnatural epicurism of these ferocious beings.

That many of the nations of antiquity fed upon this revolting diet there is ample testimony. The ancient people of Scythia bore the name of anthropophagi, so much addicted were they to this practice. The Læstrygones, the original inhabitants of Sicily, were cannibals, and it is recorded of them that they devoured the companions of Ulysses. The ancient Gauls had the same propensity. Nay, there is evidence that amongst the early inhabitants of Britain this habit prevailed: Diodorus Siculus (lib. v.) declares that the Gauls bordering on Scythia were exceedingly fierce, and ate men like the Britons that inhabit Iris. St. Jerome also charges a British nation with this practice: he says, quid loquar de cæteris nationibus, cum ipse adolescentulus in Gallia viderim Scotos, gentem Brittanicam, humanis vesci carnibus, et cum per silvas porcorum, greges, et armentorum, pecudumque reperiant, pastorum nates, et fœminarum papillas solere abscindere, et has solas ciborum delicias arbitrari St. Jerome died A. D. 420; at this period, therefore, a British colony in Gaul, if this be the meaning of the passage, fed upon human flesh, and esteemed the haunches of men and the breasts of women the greatest delicacies.

The Lydians were in all probability eaters of human flesh: at least Cambes, one of their kings, if we are to believe Ælian, devoured his own wife. Other examples will be brought forward in the progress of this chapter

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* S Hieronymi, Opera Omnia, Par 1609, i 523.

Besides revenge and a depraved appetite, other incentives are known to occasion cannibalism: the obvious one of supporting existence under circumstances of emergency, and the very curious one of evincing veneration for the dead. The history of this appalling custom may be arranged in the following order:—cannibalism through relish of human flesh; on account of famine; to gratify revenge, and through motives of veneration.

The proofs of the existence of a relish for human flesh are unfortunately numerous and convincing. Some shocking details have been given by Dapper, in his description of the kingdom of Ansico (Western Africa), of the cannibal practices of the natives. He says they feed on human flesh, and have public markets, where, in place of beef and mutton, they hang up the parts of the human body. They conceive that the circumstance of being an enemy warrants that barbarity, and that they possess a right to dispose of their slaves as they would their beasts. Thus, when they cannot sell their prisoners of war, they fatten, kill, and eat them; or else sell them to the butcher. Slaves are even found who, weary of life, offer themselves to their masters to be slaughtered, and to serve as food. A father feeds without horror on his son's flesh, the son on that of his father; and brothers and sisters eat each other. This is the reason that they do not inter their dead; the stomach of the living serves as their sepulchre, and human beings are devoured as soon as they have rendered their last sigh.*

Captain Stedman was assured by a person who travelled far into Africa, that he at length came to a place where human legs, arms, and thighs hung upon wooden shambles, and were exposed for sale like butchers' meat at Leadenhall market.†

The following dreadful account is given by Mr. Earle of a New Zealand feast witnessed by him, during his residence there in 1827:—"On a spot of rising ground, just outside the village, we saw a man preparing a native

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[*] Description de l'Afrique, traduite du Flamand de O'Dapper, p 338.
[†] Narrative, ii. 267

oven: a hole is made in the ground, and hot stones are put within it, and then all is covered up close. As we approached, we saw evident signs of the murder which had been perpetrated; bloody mats were strewed around, and a boy was standing by them actually laughing: he put his finger to his head, and then pointed towards a bush. I approached the bush, and there discovered a human head (that of a young and pretty girl).—We ran towards the fire, and there stood a man occupied in a way few would wish to see. He was preparing the four quarters of a human body for a feast: the large bones having been taken out, were thrown aside; and the flesh being compressed, he was in the act of forcing it into the oven. While we stood transfixed by this terrible sight, a large dog which lay before the fire rose up, seized the bloody head, and walked off with it into the bushes, no doubt to hide it there for another meal! The man completed his task with the most perfect composure, telling us at the same time that the repast would not be ready for some hours!" Mr Earle was afterwards informed, "that human flesh required a greater number of hours to cook than any other, that if not done enough, it was very tough; but when sufficiently cooked, it was as tender as paper."*

The latest information we have on this subject is the relation of Mrs. Guard, whose husband was commander of a ship wrecked on one of the South Sea islands. This lady, her two children, and nine seamen were made prisoners. She had received several wounds on the head from their tomahawks, from which the blood flowed rapidly. They voraciously licked up the blood; and when it ceased to flow attempted to make an incision in her throat to obtain a further supply. She remained amongst them, in the greatest misery, for several months, during which she saw the natives cut up and eat the sailors whom they had captured, occasionally bringing some pieces of the flesh to her, and inviting her to partake of it with them. After many perilous escapes, she and her two children were delivered up by these savages to her husband.*

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* Narrative of a Residence in New Zealand, pp 144 166.

Epicures in human flesh differ as much in their preference of parts, as ordinary epicures do in the delicious morsels of animals usually brought to table. The New Zealanders prefer the entrails. The inhabitants of New Caledonia avowed, to those persons who came in search of the unfortunate La Perouse, a great partiality to human flesh, they preferred the muscles. Mr. Anderson informs us that among the Battas, a nation of Sumatra, some are of such brutal and depraved habits, that from custom they could not relish any other food than human flesh. "The rajah of Tanah Jawa, one of the most powerful and independent Batta chiefs, if he does not eat human flesh every day is afflicted with a pain in his stomach, and will eat nothing else. He orders one of his slaves (when no enemies can be procured, nor criminals, for execution) to go out to a distance, and kill a man now and then, which serves him for some time; the meat being cut into slices, put into joints of bamboo, and deposited in the earth for several days which softens it. The parts usually preferred, however, by epicures are the feet, hands, ears, navel, lips, tongue, and eyes.† "A stout ferocious-looking fellow, with muscular bandy legs, came in as I was conversing on the subject of cannibalism, and was pointed out to me as a celebrated marksman and man-eater: he gave me the following horrid details of cannibalism. He said that young men were soft, and their flesh watery. The most agreeable and delicate eating was that of a man whose hair had begun to turn grey."‡ About half a century since, certain gipsies, brought to trial in Hungary, were convicted of cannibalism. They confessed that they murdered three people, and feasted on their bodies at a marriage festival. They declared that they preferred the body of a person of 16 or 18 years of age. Notwithstanding the respect shown by the Hindoos to animal life, there is a sect of them who are said to eat human bodies. The result of the experience of these cannibal epicures, is that the human brain is the most delicious morsel of their unsocial banquet.* During the famine which prevailed amongst the crew of an English ship burnt on sea in 1727, they were compelled to support nature by eating parts of their dead companions, and drinking their blood, each dead body furnishing about a pint. The only part which they could relish was the heart. It is stated by Stedman, on the authority of an officer who had the curiosity to taste human flesh cooked by some Gango negroes, that "it was not inferior to some kinds of beef or pork." The opinion of the ancients was that the taste of human flesh most resembled that of pork. (*Galen.*)

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* Times Newspaper, 1835 † Mission to Sumatra, p 225 ‡ Ibid p 122

From all these statements it appears that human flesh is not very different from some other kinds; that to those who have got over the moral disgust of such food, it is not only not inferior, but has recommendatory qualities that render it a kind of delicacy. The following instances from Herodotus show that even those by whom human flesh is eaten for the first time, and are not aware of the kind of meat on which they feed, do not perceive any difference between it and flesh to which they have been accustomed. They are valuable facts, because, as far as I know, they are the only instances of the kind on record.

Cyaxares, king of Media, employed as huntsmen some Scythians so skilful with the bow that on one occasion only they returned from the field unsuccessful. The king treating them contumeliously, they in resentment cut up a boy, cooked his flesh in the manner of their usual game, and served it up to the table of the king. Cyaxares and his guests actually ate his flesh without perceiving the difference, although he had been in daily habit of using the game supplied him. There is another relation also in the same author, which, harrowing as it is, evinces this resemblance of taste. Astyages, son of Cyaxares, and last king of Media, in order to revenge the deception practised on him by Harpagus in saving the infant Cyrus, whom the king had ordered him to destroy, invited Harpagus to a supper, and desired that he would send his son to remain with Cyrus, now a growing-up youth. Harpagus appeared at supper accordingly, and having eaten heartily, without perceiving any peculiarity of his food, Astyages inquired if he relished his dish, to which the former replied in the affirmative. The servants then, obeying a signal, presented Harpagus with a covered vessel containing the head, hands, and feet of his son, desiring him to remove the cover and help himself as he pleased. On opening the vessel, he beheld the remains of his son, but restrained his feelings. Astyages asked if he knew what game he had eaten. He replied that he did, and was pleased with it, as it was done by the king. He, however, afterwards proved how far he was pleased by the ample vengeance which he took.

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* Forbes's Oriental Memoirs, i. 27.

To the examples already adduced of the preference given by some nations to human flesh as food, the following need only be added.—Mr. Anderson says that one or two Battas mentioned to him "their having partaken of human flesh repeatedly, and expressed their anxiety to enjoy a similar feast upon some of the enemy. This, they said, was their principal inducement for engaging in the service of the sultan." Another boasted of having drunk the blood as it flowed warm from the veins of his wife's seducer, whose head he cut off.

Stedman relates that a ship's crew and their captain being captured by the negroes of Great Drewin, about 30 miles north of the river St. Andrews, they were all cut to pieces, and salted, in order that no part of such valuable food should be lost.

Cannibalism, although always calculated to excite horror, is divested of atrocity when it is resorted to in the last agonies of starvation, unless accompanied by murder. When the principle of self-preservation comes into full operation, all social relations seem to be dissolved, and there is no act which men will not commit in order to preserve existence. In almost all the instances

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* Herod. lib. 1.   † Mission, p. 37.

on record, where a number of persons have been reduced to the last extremity of hunger, they, however, not only relieved the cravings of nature by feeding on their miserable companions who had already fallen victims to the horrors of their situations, but in order to obtain a new supply, have dispensed with adherence to the laws of God and man by committing murder, and at a time when another dawn would probably call them before their Maker, to answer for an offence badly disguised by the fairness of the process by which the fatal lot was drawn.

It is not the province of man to pronounce judgment on the ethics of his fellow-creature, in the last extremities of starvation, when the feelings are rendered obtuse and the intellects feeble by a situation which, perhaps, none can appreciate but those who have felt its influence. The history of shipwrecks, sieges, and famine, affords ample testimony that the repugnance of civilised man to human flesh is generally overcome by the cravings of nature. An exhibition of this fact, on a lamentable scale of magnitude, is to be found in the fatal expedition of the French into Russia, under Napoleon. During their retreat, when the supply of horseflesh failed, these miserable spectres of a once noble army, protected against the misery of a severe winter only by the rags of their former trappings, crawling over the frozen snow by the aid of staves, their muskets being abandoned, often fed upon the half-broiled bodies of their wretched companions, who, in a fit of insanity, had thrown themselves into the fires kindled for the purposes of warmth. Squatting down on the ground, they relieved the pangs of famine for another 24 hours; when, in their turn, it became their lot to surrender their lean and withered bodies to supply the wants of others. Nay, we are informed by General Segur, that the soldiers rushed round the dying, and frequently waited not for their last breath before they commenced devouring them. The case of one poor fellow deserves notice. He had both his legs broken in an engagement, and had fallen unnoticed amongst the dead. The body of a horse, embowelled by a shell, was at first his asylum. Afterwards, the muddy water of a ravine into which he had rolled, and the putrefied flesh of the dead served for fifty days as dressing for his wounds and food for the support of his languishing existence.* The narrative of Lebaume gives instances of similar horrors.

The mad project of Napoleon occasioned less misery to his army, than the no less insane expedition of Cambyses did to Ethiopia. The wretched soldiers of Napoleon devoured the bodies of their comrades, who had already sunk under their sufferings, but the Persians, after devouring all their beasts of burthen, were obliged in the desert sands of Arabia to decimate the living, and in cold blood to slaughter their companions in arms, like cattle, to satisfy the cravings of nature. and thus ended the expedition of this madman. We learn from Polybius, that the mercenaries in the pay of the Carthaginians were reduced to such extremities by famine that they were forced to feed on the prisoners and slaves, all of whom they devoured.

During the siege of Paris by Henry IV 30,000 persons died of famine in one month The miserable citizens attempted to make a kind of nourishment from the bones of the dead, which being bruised and boiled afforded a sort of jelly. But this unnatural diet occasioned even a more speedy death. It is related and attested by the most authentic testimony that one woman actually murdered and devoured her own child. The same tragedy was enacted at the siege of Jerusalem: such was the famine that human flesh was commonly eaten, and mothers ate their children. In the year 945, during a famine at Bagdad, even punishment could not restrain persons from devouring children During the famine of Samaria, B. C. 893, mothers ate their children.‡

An appalling account of feeding on human flesh is given by the poet Spencer in his description of one of the famines of Ireland. We have heard of the feasting of jackals and hyænas on the putrid remains of corpses which they scratch out of their graves; but this was actually done by the miserable Irish, urged by irresistible necessity. The following is his pathetic statement. Speaking of the people of Munster, he says, "They were brought to such wretchedness, as that any stony heart would have rued the same. Out of every corner of the woods and glynnes they came creeping forth upon their hands, for their legs could not beare them; they looked like anatomies of death; they spake like ghosts crying out of their graves; they did eate the dead carrions, happy were they that could finde them; yea, and one another soone after, insomuch as the very carcasses they spared not to scrape out of their graves; and if they found a plot of water-cresses or shamrocks, there they flocked as to a feast for the time." *

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* Russian Expedition ii 180 545

† Voltaire, [illegible] sur [illegible] Geogr [illegible]

‡ 2 Kings, vi. 29.

But perhaps the most extraordinary instance on record of cannibalism, arising from starvation, is that of the Indian captives, related by Petrus de Osma (1558), who, for want of other food, actually cut off the calves of their own legs; and having broiled them, devoured them.

Cannibalism from a vindictive motive, once so general amongst savage nations, still exists, notwithstanding the progress of Christianity. Perhaps no where was it practised with more cold-blooded, and as may be said curious barbarity, than amongst the Brazilian savages in time of war. After a sanguinary fight, conducted with amazing animosity and fury, the prisoners were carried away, and subjected to extraordinary treatment, apparently kind, but instigated by a diabolical motive. When the prisoner arrived at the village, his captors made him cry out "Here I am, come to be your meat." Out came the whole population He was delivered over to the women, who beat him with their fists, pulled his beard, naming at each blow some slain friend, and then half strangled him with cords. A woman then approached, and with a bit of broken glass scraped off his

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* Spenser's View of the State of Ireland, 1633, p 72.

eyebrows, and, if she could, his beard. They then compelled him to dance to their singing.*

They next made preparations for the feast; but while these were going on the prisoner was fed with the most delicate viands: nay the captor gave his sister or his daughter to him for a wife. Should there be any progeny resulting from this marriage, it was considered entirely with reference to the father, and sooner or later it was murdered and devoured.†

A drinking feast then commenced, at which the prisoner partook of the potations. He was afterwards mocked and insulted; he retorted, by boasting of the numbers of their fathers and sons he had murdered. Stones were then placed beside him, and he was told to revenge his death before he died, which he often did to their cost. The fire at which he was to be roasted was kindled before him, and he who held the fatal club advanced, saying "Lo! here am I, who am about to kill thee, because thou and thy people have killed many of our brethren and devoured them." The prisoner replied, "It is the chance of life; my friends are many, and they will take vengeance for me." The club-man then stunned him, or at one blow knocked out his brains.

Instantly the body was seized by the women they dragged it to the fire, scalded it, and skinned it. His wife forced out a tear, and endeavoured to get the first mouthful. The arms and legs being cut off, four women took each a limb, and danced about. The trunk being split, the intestines were left to the women, who boiled and ate them in broth: the head was also their share, but the tongue and brains were allotted to the children, who were also smeared with blood. The old women presided at these feasts; they stood by the flesh while roasting, and caught the fat as it fell, licking their fingers. Out of the arms and thigh-bones they made flutes; the teeth were strung into necklaces, and the skull was used as a drinking cup. So ended the tragedy.‡

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* Southey's Hist. of Brazil, i. 186.

† De Lery, Voy. en la Terre du Bresil, 1578.

‡ Southey's Hist. of Brazil.

A jesuit found an extremely old Brazilian woman at the point of death.* He inquired whether there was any kind of food she could take, suggesting sugar, or a mouthful of some European delicacy. "Ah!" said she, "my stomach goes against every thing. There is but one thing which I think I could touch: if I had the little hand of a little tender boy, I think I could pick the little tender bones, But, woe is me! there is nobody to go out and shoot one for me!"*

Some of the chief atrocities of the Brazilians have been noticed by other travellers in South America. Pedro de Cieca declares that it was a practice to eat the children borne to them by their female captives, and also to give wives to the male captives, in order that the progeny might be fattened and eaten. He further affirms that human flesh was exposed in the shambles for sale.

The following account is from the North American Review, April 1827, p. 372. —"There is a horrible institution among some Indian tribes, which furnishes a powerful illustration of their never-tiring love of vengeance. It is called the man-eating society, and it is the duty of its associates to devour such prisoners as are preserved and delivered to them for that purpose. The members of this society belong to a particular family, and the dreadful inheritance descends to all their children, male and female Its duties cannot be dispensed with, and the sanctions of religion are added to the obligations of immemorial usage. The feast is considered a solemn ceremony, at which the whole tribe is collected as actors or spectators. The miserable victim is fastened to a stake and burned at a slow fire, with all the refinements of cruelty which savage ingenuity can invent. There is a traditionary ritual, which regulates, with revolting precision, the whole course of procedure at these ceremonies. The institution has latterly declined; but we know those who have seen and related to us the incidents which occurred on these occasions, when white men were sacrificed and consumed."

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* Southey's Hist. of Brazil.

A shocking instance of cannibalism, perpetrated as a barbarous revenge, by a comparatively civilised nation of antiquity, is described by Ælian. Dionysius, the second tyrant of Sicily, after the successful rebellion of his brother-in-law Dion, fled to Locri, a town in Italy, on the Adriatic Sea. He here commenced a new series of villanies, and numbers of the young damsels of the city fell victims to his brutal propensities. On a reverse of his fortune, their relations revenged them by violating his wife and daughters. They then murdered them, cut the flesh from their bones, devoured it, and pulverised the bones in mortars. The ferocious barbarity of the revenge was in keeping with its injustice.

Amongst the Battas, a nation of Sumatra, as we are informed by Sir Stamford Raffles, certain offences are punished with a sanguinary and barbarous vindictiveness that shocks human nature. The offender is not only eaten, but eaten alive, with pepper and salt, either raw or after his flesh has been broiled! The following is the process, performed in cold blood.—The victim is tied to a stake, with his arms extended; the party collect in a circle around him; and the chief gives the order to commence eating. The chief enemy, or the party injured, has the first selection; and after he has cut off his slice, others cut off pieces, according to their taste and fancy, until all the flesh is devoured. The heart is a favourite part; but "the palms of the hands and the soles of the feet are the delicacies of epicures:" the blood is drunk from bamboos. This kind of punishment is adjudged to adultery, midnight robbery, treacherous attacks, and some other offences. A prisoner taken in war is eaten immediately, and on the spot. Whether dead or alive, he is equally eaten, and it is even usual to drag the bodies from the graves, and eat the flesh. It is the practice not to kill the victim till the whole of his flesh has been eaten, should he live so long. Sir Stamford Raffles adds, that independently of the desire of revenge, which may be supposed to exist amongst the principals, about half the people present at the feast eat the flesh with a relish;

human flesh being considered preferable to cow or bull-beef, or hog.*

The following is the statement given by Mr. Marsden of this horrible tragedy amongst the Battas:—The unhappy object, whether prisoner of war or malefactor, is tied to a stake; the people assembled throw their lances at him; and when mortally wounded, they run up to him as if in a transport of passion, cut pieces from the body, dip them in a dish of salt and lemon-juice, slightly broil them, and swallow them with savage enthusiasm. Instances have been known where, with barbarity still aggravated, they tear the flesh from the carcass with their mouths.†

The account given by Sir Stamford Raffles was derived from a number of Batta chiefs, collected for the purpose of inquiring into this very subject.

A rajah told Mr. Anderson (*Mission*, 1826) that a man had been eaten in five minutes; the pieces of his flesh had been shared amongst numbers of warriors, as cakes amongst children. He was informed by the Tumungong, married to the daughter of the rajah of Scantar, that cannibalism is quite common in Sumatra. (P. 315.) The heads of people killed in war are reckoned valuable property, and are sold to the relations at thirty or forty dollars each. The fact of human flesh being eaten with pepper and salt, is confirmed by Beaulieu.

Cannibalism through veneration is certainly a most singular practice, and arises from habits of thought not easily understood. To subject the remains of a friend or relative to the process which the food undergoes in the alimentary canal, is, when we consider the results, a curious mode of paying respect to his memory: yet, as this practice has obtained in all ages, it must have some foundation in nature. According to Herodotus, it was the custom of the Issedones, a nation of Scythia, when a father died to assemble his relations. They brought cattle with them, which, being killed, the flesh was cut in pieces along with that of the deceased, and both being mixed, they commenced eating it. The skull, after being well cleaned, was gilded; and was ever after used as a sacred cup at the commemorative annual festival observed by the son. Other nations of Scythia gilded the inside of the skulls of their enemies, and made drinking cups of them: the skins were tanned for cloaks; for Herodotus says the tanned human skin excels all others in whiteness and brilliancy.

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* Memoir of Sir Stamford Raffles, by his Widow, 1830, pp 432 484

† Marsden's Sumatra, p 300

According to the same author, the Massagetes, a powerful people inhabiting a region east of the river Araxes, did not fix a certain limit to human life; but when any one was advanced in years, all his neighbours assembled and killed him, and with him all his cattle. then cooking the flesh all together, they feasted on it, and this they deemed the happiest of deaths. One who died of disease they did not devour, but buried him, thinking the greatest public misfortune had befallen him, inasmuch as it was not his lot to be immolated.

The Padæans, an Indian nation, adopted a similar practice. Herodotus says, when any one laboured under disease, whether man or woman, the nearest relatives or most familiar friends killed him, professing, as their motive, that if the person were wasted by disease his flesh would be unfit for food. It was common to find a sick man denying himself to be ill, but his friends being of a contrary opinion, killed and feasted upon him. Thus also when a woman was ill, her nearest relatives followed the same practice as the men. Whoever attained old age, they also killed and devoured. but this happened to few; for the generality falling into some malady, were put to death. With some other Indians it was the rule not to take life from anything that had breathed, if any one of their number fell sick, he went forth to some desert place, and there laid himself down, nor did they think more of him, whether dead or sick.

This considerate attention on the part of the relatives of the sick person might be very amiable. Its amount is simply murdering a man lest he should die a natural death, and thus prevent his receiving the posthumous honour of sepulture in the stomachs of his friends.

Yet is a curious fact, that up to the present hour a custom still obtains, amongst some tribes of India, much resembling that reported by Herodotus to have existed there 2300 years ago. It is stated in Dr. Spry's work on India, that it is the custom of a tribe of Goands, who reside in the hills of Oomercuntuc, to cut the throat of any person of their family who is attacked by any illness from which there is no chance of recovery. They then collect the whole of their relations and friends, and feast upon the body. In like manner, when a person arrives at a great age, and has become feeble, he is similarly operated upon, and the various members of the family assemble for the like purpose. These people do not consider cutting the throats of their sick relations or aged parents any sin; but, on the contrary, an act acceptable to their deities, a mercy to their relations, and a blessing to their whole race.* This view of the pious tendency of murder has been taken by several other eastern nations Jonas Hanway relates that the Mingrelians held it a piece of charity to murder the the sick when past recovery, for by so doing they are freed from their misery

Amongst the Batta nation of Sumatra, also, the practice prevails of devouring their relations, when they are old or infirm. Nay, this is sometimes done by the particular desire of the person chiefly concerned, who invites his near relations to the feast On this subject, Dr Leyden says, "Marsden confines their cannibalism to two cases,—that of persons condemned of crimes, and that of prisoners of war, but they themselves declare that they frequently eat their own relations, when aged and infirm, and that not so much to gratify their appetite as to perform a pious ceremony. Thus, when a man becomes infirm and weary of the world, he is said to invite his own children to eat him, in the season when salt and limes are cheapest. He then ascends a tree, round which his friends and offspring assemble; and as they shake the tree, join in a funeral dirge, the import of which is, 'the season is come, the fruit is ripe, and it must descend.' The victim descends, and those that are nearest and dearest to him deprive him of life, and devour his remains in a solemn banquet. This is the account of the Battas themselves."[*]

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* Modern India, 1837

The following lines from an amatory poem, written originally in the Sayer verse in which Malay romances are composed, afford a specimen of rather a suspicious kind of rapture:—

> Her figure like those of a statue, or scenic figure,
> Her forehead like the new moon in its first day,
> Her eyebrows curved, so fair — I could devour her.[†]

Previously to the conquest of Mexico, the Zempoallans offered human sacrifices; after which, cutting the bodies into portions, they were sold to the people as sacred food. The unfortunate beings who were to be sacrificed were often previously fed in cages, as we fatten poultry in coops.

To the foregoing sources of cannibalism might be added another, but that its occurrence is so rare as scarcely to warrant its admission as such, as it seems rather to constitute a disease or madness. The following instance of it is singular, and dreadful to contemplate. It was the case of a man, aged about thirty, who from his infancy experienced a pressing necessity to feed on putrid human flesh. He used to glide into the cemeteries, scrape the dead from their graves, cut off the flesh, and hide it in holes in store for the calls of his disgusting hunger. His appetite, however, was moderate as to quantity. This habit lasted for twenty years, when he first attempted homicide. Such is the state to which mental perversion may reduce our unhappy race.[‡]

It is said that the eating of human flesh, even with a view of satisfying the cravings of intense hunger, generates in a very short time a peculiar ferocity of disposition which extinguishes all love of social order and discipline. Whether this proceeds from moral or physical causes does not appear, both views may be defended. That cannibalism should act detrimentally on the human character, in a moral point of view, has probability on its side. There is something so revolting in the idea of converting the stomach of the living into the tomb of the dead; so atrocious in the act of violently or treacherously dissolving the connection of a fellow-creature with all that he holds dear in this world; so selfish in the desire of sustaining one's own life by sacrificing that of another who has not aggressed,—that even some cannibal nations have a detestation of their own offence. Conscious of the character which it imprints on their nature, they dread and distrust each other; every one suspects and is suspected; and this general feeling of insecurity destroys the sympathies of human nature, and resolves society into insulated individuals, selfish, cruel, treacherous, and rapacious as the tiger.

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[*] Asiatic Researches, x 202.
[†] Ibid. p 183.
[‡] Andral. see Lancet, No. 492.

On the other hand, there are circumstances which render it probable that, at least sometimes, the causes which induce this ferocity of character are physical. On the emergencies in question, human flesh is generally eaten raw; for the circumstances are such as not to admit the use of fire. Now it is known that dogs fed on raw meat become more than ordinarily fierce, and this expedient has often been resorted to with that object in view. Analogy would therefore suggest that man might be similarly affected by similar treatment, and the facts observed correspond with the suggestion.

It may be the truth that both moral and physical causes often concur in the phenomenon. It is shocking to think, yet it must be admitted as true, that a kind of unnatural epicurism is brought into operation, which the wretched subject of it is far from being inclined to resist. It is the opinion of the Southern Indians about Hudson's Bay, says Mr. Hearne, that when any of the tribe have been driven to the necessity of eating human flesh, *they become so fond of it that no person is safe in their company.* And though they never feed on this horrid repast but when driven to it by necessity, yet those who have made it are shunned, universally detested and frequently murdered slily. I have seen such persons: a smile never graced their countenances, while the eye most expressively spoke the dictates of the heart, and seemed to say, Why do you despise me for my misfortunes? The period is probably not far distant when you may be driven to the like necessity.* The unnatural relish which the unfortunate person has acquired for human flesh, and the consciousness of his having become detestable on that account, may both coincide in depraving his character.

In conclusion, it may be observed that there are abundant proofs, ancient and modern, that men have at all times devoured men; and that in many countries human flesh was preferred as being a superior quality of food. In the savage state, before religion, morality, or civilisation had any influence in refining man's notions, there was nothing to deter him from a banquet which pleased his palate, gratified his revenge, and saved him the trouble of the chase.

Perhaps the reader may not choose to go the length of agreeing with Lord Monboddo, who declares his conviction "that all nations have at some time or another been cannibals"† Yet as we have positive evidence that in so many parts of Europe, Asia, Africa, and America, both North and South, as well as in many of the islands scattered over the globe, cannibalism was practised, the universality of the position can only be denied on the grounds of the historical evidence being not quite complete. Of these interruptions in the concatenation of proofs, those persons may avail themselves who are anxious to defend their species from this stigma.

Order II. QUADRUMANA.

Simiæ.—We have now to consider those animals that are used as food from the order *quadrumana*, or four-handed; the first family of which comprises the *Simiæ*, or monkeys, apes, and baboons. In this family we find approximations in various degrees to the human species; and in some instances so striking is the resemblance, that on this and other grounds the learned but eccentric Lord Monboddo has defended the argument that mankind and the simiæ tribe are descended from the same origin. He conceived that the ouran-outang is of the same species as man; and relying on the statements of certain travellers, he believed that there were in the world races of men who still retained their tails.* The negroes go a step further: they believe monkeys to be a tribe of men who are too lazy to occupy themselves with legitimate industry, and hence lead a vagrant and dishonest life. In parts of Hindostan they have a better repute, and are gratified with something like divine honours. These social animals live in communities, and make themselves houses. They resent injuries, make war, associate in troops, arm themselves with sticks and stones, and fight desperately When hurt, they moan and cry. Dampier says that when he has shot at one, and broken a leg or an arm, he has pitied the poor creature, to see it look at and handle the broken limb, and turn it from side to side. When pleased they are frolicsome, imitative, and mischievous · they take a deep interest in every thing, and their curiosity is obtrusive and impertinent. They evince much parental affection. The society of man is greatly enjoyed by them, and the beauty of our ladies is beheld by no means with indifference by them. Pliny tells us that Mutianus affirmed he saw apes play at some game like chess. The negroes of Guinea are firmly persuaded that they can speak, but refrain from doing so lest they should be made to work. When Agathocles undertook his expedition into Higher Africa, he entered a country abounding with apes, and he came to three cities called Pithecusæ, or the Cities of Apes. The apes were worshipped as gods, and came into the houses, and took meat and provisions without disturbance: whoever killed one was sure to lose his life, as one who had not veneration for the divinities.† According to Herodotus, apes were they differently treated by the Gyzantes, a Lybian nation; they abounded in the mountains, and when captured were always eaten. Baboons, the most disgustingly ugly of the whole family, are nevertheless great admirers of beauty, and are subject to the passions of both love and jealousy. It is the young and handsome of the females of our species that become the objects of the tender passion. Should the lady, insensible of her lover's devotion, show a preference to some human admirer, the jealousy of his ugly rival is immediately excited, and his fury becomes ungovernable. Mr. Pennant relates that a footman who brought a young girl to see a dog-faced baboon, in order to tease the animal, "kissed and hugged her." The baboon, in a rage, caught hold of a quart pewter vessel, and threw it with such force and so sure an aim, that had not the man's hat and wig lessened the force of the stroke, his scull must have been fractured.

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* Hearne's Journey, p 34 † Origin, &c of Language, i 209.

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* Origin, &c of Language, vol i † Diod. Sic xx. 3

Some of the simiæ have been known to drink wine, chew tobacco, and mimic almost any action which they see performed by human beings, of the operations of whom they are accurate and attentive observers. There is one other very striking point of coincidence between the constitution of these animals and human beings — their susceptibility of the same diseases, as measles and small-pox.

Notwithstanding the resemblance of this family to the human species in anatomical structure, in appearance, habits, passions, propensities, and intelligence, some nations, nay Europeans, commit what may be designated an approach to cannibalism, and eat them with some degree of relish. By some their flesh is said to have little to recommend it, being tough and disagreeable, by others it is praised as being well-flavoured and juicy, differences, no doubt, attributable to age, climate, and peculiarity of taste. The negroes are very fond of monkey-flesh, and prefer that of the old animal. The mode of cookery generally preferred is roasting. Don Ulloa says that all the forests near the river Chagre in Panama are full of monkeys of various sizes, from a foot to a yard, and of different colours. The flesh of all is highly valued by the negroes, especially that of the red. However delicate the meat may be, the sight, he says, is enough to make the appetite abhor them: for when dead the animal is scalded in order to take off the hair; and when cleaned it looks perfectly white, and greatly resembles a child of two or three years of age when crying. The resemblance is shocking to humanity. Yet the scarcity of other food in many parts of America renders the flesh of these creatures valuable; and not only the negroes, but the creoles, and Europeans themselves, make no scruple of eating them.* The following description of the process of cookery and its results is given by Humboldt.—"The manner of roasting those anthropomorphous animals contributes singularly to render their appearance disagreeable in the eyes of civilised man. A little grating or lattice of very hard wood is formed, and raised one foot from the ground. The monkey is skinned and bent into a sitting posture, the head generally resting on the arms, which are meagre and long; but sometimes they are crossed behind the back. When it is tied on the grating, a very clear fire is kindled below. The monkey, enveloped in smoke and flame, is broiled and blackened at the same time. On seeing the natives devour the arm or leg of a roasted monkey, it is difficult not to believe that this habit of eating animals that so much resemble man in their physical organisation has in a certain degree contributed to diminish the horror of anthropophagy among savages. Roasted monkeys, particularly those that have a very round head, display a hideous resemblance to a child; the Europeans, therefore, who are obliged to feed on quadrumana, prefer separating the head and the hands, and serve up only the body of the animal. The flesh of monkeys is so lean and dry, that M. Bonpland has preserved, in his collections at Paris, an arm and hand which had been broiled over the fire at Esmeraldi, and no smell arises from them after a great number of years."

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* Voyage to S. America, i. 1 1

Amongst the American Indians, the animal is killed by means of an arrow envenomed with a poison called *curare*, so violent and sudden in its effects that immediate death ensues from the wound; yet the flesh is perfectly free from ill quality. Indeed, various animals that are used as food are killed with poisoned arrows, and eaten with impunity. Gumilla examined a monkey killed by one of these poisoned arrows immediately before: short as the period was, the body was cold; the heart was surrounded with black coagulated blood. The Indian that shot the monkey put it down to boil, along with the clots of blood. Gumilla was surprised to see the Indians eat not only the flesh, but the blood, for this latter contained all the energy of the poison. He put many questions to them on this subject, and was so satisfied with their answers that he ventured to eat the liver, which appeared to him as savoury as that of the most delicate pig, and from that time always partook of their game. The poison, he says, is of so singular a kind that it may be taken into the mouth, and even swallowed, without injury; provided there is no wound in the mouth or gums: its energy is exerted exclusively on the mass of the blood; and having once entered the circulation, it produces instant death.*

Many cruel and useless experiments were made by M. Herissant on the nature of a South American poison of a most deadly nature, much used by the Indians for poisoning their arrows; in the course of these, he killed rabbits with poisoned weapons, and ate of their flesh, as did also several other persons, not one of whom perceived the least indisposition.† Perhaps this poison may be obtained from the same source as the curare.

Gumilla says, elsewhere, that some nations of America detest yellow and black monkeys, but have a decided relish for white ones. The flesh of the latter, he says, is good food; but is always tough, however cooked: the liver is accounted a delicate morsel.‡

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* Hist de l'Orenoque, iii 3 9 † Phil. Trans. 1751.

‡ Histoire de l'Orenoque, ii. 9.

The Chevalier des Marchais gives the following account of eating monkeys in South America:—" Although in general the monkeys are not very fat, their flesh is allowed to be good nourishment, and very delicate. The heads are made into soup and are served with it. A person at first experiences some difficulty in accustoming himself to see heads which resemble those of little children; but when this repugnance is once conquered, he finds that monkey-soup is as good as any other."

Flying Lemur, or *Colugo.*—In the Pelew Islands they eat a kind of animal which partakes of the nature both of the bat and the lemur. It is called colugo, or flying lemur. It has an immense expansion of a membrane similar to that which constitutes the wings of the bat, and it is thus enabled to fly about, although its length from the head to the end of the tail measures three feet. It can run as well as fly, and it climbs trees with great facility.

Vampire Bat.—This animal is so named from the propensity which it possesses in common with the fabled demon of the same name. It is a gigantic species, sometimes measuring six or seven feet across the expanded wings from tip to tip; three feet is very common. The body varies from the size of a pullet to that of a dove. He is a lover of blood, sucking it from human beings, horses, mules, and asses An insidious destroyer of life, he fans his sleeping victim with his soundless wings while he sucks the vital stream. Well might this dusky, hideous creature, seen by the waking sufferer perched upon his limb and gorging himself with the crimson streams of life, suggest the idea of a vampire. They are found abundantly in India, Guinea, and New Holland. In Madagascar they are as numerous as formidable. They have been the plague of South America, and are said to have actually retarded the population of some parts of it. Don Ulloa says that in Carthagena, the capital of the province of the same name, the vampire

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[*] Voyage du Chev des Marchais, iii 311.

bats cover the streets like clouds; and that as the heat obliges the people to leave their windows open, the bats enter, and often endanger life by attacking any part which they find uncovered.*

The following account is given by Stedman. He says the vampire of Surinam, knowing that a person is in a sound slumber, alights near the feet, where, while he fans with his enormous wings, he bites a piece out of the top of the great toe smaller than the head of a pin, and sucks the blood until he is obliged to disgorge. He then begins again, and thus continues sucking and disgorging until he is scarcely able to fly. The sufferer, however, has been known to sleep from time to eternity. Captain Stedman was himself bitten by one of these creatures: he observed several heaps of congealed blood all round the place he had lain, and it was the opinion of a surgeon that he had lost twelve or fourteen ounces of blood. He measured one of these bats, and found it upwards of thirty-two inches from tip to tip.†

It is a singular fact in the history of these creatures that they are very much addicted to indulgence in intoxicating liquors, as palm-juice, wine, &c., and this propensity causes their destruction, for they are so overcome by their potations that they are then easily taken. The depredations of the vampire are not confined to man, they attack cattle, and bleed them without mercy.

This disgusting quadruped, for such it is, does not escape retaliation. In some parts of the world it is not only used as food, but is esteemed a very great delicacy. They are eaten at Madagascar, on the Malabar coast, in Tongataboo, Malaya, the Isle of France, and many other places. Concerning the quality and flavour of this kind of flesh accounts differ, some comparing it to partridge, some to rabbit, and some to hare, which in colour it more nearly resembles. The Abbé de la Caille says, that in the Isle of France the vampire "is very fat during April, May, June, July, and August; and that they boil it in their soups to communicate richness and flavour, instead of poultry."* This is, no doubt, the bat which De Cabral saw about Cananor, which he says is as large as a kite, with a head like that of a fox, and was much relished as food.† The African negroes reject it with horror, and would endure the greatest hunger rather than partake of it.

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* Voyage to South America.

† Narrative, ii. 143.

Order III. Bruta.

The *Sloth*, otherwise called the *Ai*, on account of its habit of uttering that sound, as if in lamentation or supplication, is a most singular creature; the most helpless of all quadrupeds on the ground, and one of the most active in the trees, where its natural residence is, and from which it almost never departs. There it readily grasps the branches with its claws, and progresses from tree to tree with an agility that proves how greatly misapplied is its name. On the ground it can with the greatest difficulty scramble over a few yards, a very picture of laborious and painful effort; so awkwardly are its ill-constructed and disproportionate limbs fastened to its body. It sleeps hanging from a branch, the claws of its hands and feet all grasping it in a line. Its food is the leaves, and even the bark, of the trees in which it resides. So tenacious is this animal of life, that long after the removal of the heart, the limbs will move.

The flesh of these animals is used as food in the tropical regions of South America, where alone they are found. Mr. Swainson says, that the only wild animal he ate in Brazil, whose flesh reminded him of tender boiled mutton, was the sloth.

The strength of the sloth is very great: a dog was held by one of them with equal power and perseverance for four days until the dog died of starvation; but the sloth easily survived, for he can endure a fast of forty days.

The *Great Ant-eater* is another most singular creature, and a striking instance of the adaptation of organisation to the mode in which the animal is to support his existence. The great ant-eater or ant-bear, although a powerful animal, is timid and inoffensive; for he labours under defects of conformation which are not compensated by the mere possession of strength. He is deficient of teeth; but their want, as a means of defence, is in some degree supplied by a formidable phalanx of claws, with which he fights and scratches with desperation when attacked: these, however, he only can use when lying on his back, or sitting on his haunches. His head is the chief part of his construction to be admired; it is long, slender, and tapering. His tongue is eighteen or twenty inches in length, and is almost cylindrical. Below the root of the tongue are two glands which secrete a glutinous liquid, with this the tongue is kept continually moist; and the animal can stretch it out considerably beyond his mouth, although it is so slender that it is more like a worm than a tongue. He first scratches open the ant-hill; then puts in his long clammy tongue; searches with it on all sides; and draws it out covered with ants, which he swallows. These insects are his only food. He is, notwithstanding, a powerful animal, and his stupidity is fully as surprising as his strength. He does not shun the American panther, but hugs him in close embrace, and fixes his monstrous claws in the panther's sides. In this state both lie on the ground until they perish; the one because he cannot help himself, the other because he will not, such is his obstinacy and stupidity.

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* Voyage par M de la Caille, 1763.
† Voy to East Ind.

As this animal is six feet long, from the snout to the extremity of the tail, it may excite wonder that so large a creature can support himself on such food. But the ant-eaters are not very abundant, while the ants swarm in those parts of America where the former are found These ants are nearly half an inch long, and exist in such extensive societies, that their hills or nests are often five or six feet high.

The great ant-eater is made use of as an article of food by the natives of Brazil, Guiana, and Furneaux Islands; and by some it is considered excellent, while others represent it as indifferent and rank.

The *Pangolin*, or *Short-tailed Manis*, is a kind of ant-eater, which, instead of being clad with fur, is plated over with bright sharp scales, shaped like a muscle-shell, which afford much better protection on account of their hardness. In its general appearance it has some resemblance to a small crocodile; but, unlike its archetype, it is gentle and harmless. The negroes of Africa beat it to death with clubs for the sake of its flesh, which is sometimes very fat and considered by them as a delicacy. The construction of its head, tongue, and mouth, resembles that of the great ant-eater; and it subsists in the same manner on ants. When pursued, it rolls itself up, so that nothing but the back and tail are seen. The Danish royal missionaries in the East Indies (1765), describe a pangolin which was caught in a wall at Tranquebar. It could not be killed, although struck with wooden poles armed with iron, with which rice is stamped; but the blows on the scales brought forth sparks of fire from the iron. It was at last killed by a stroke under the belly with an iron hook. It is remarkable that this little animal is an overmatch for an elephant; by twisting itself about its trunk, and squeezing it with its body and tail, on the sides of which are rows of pointed scales, for a sufficient length of time, it kills the elephant.*

The *Earth-Hog.*—Of the same family is the *African ant-eater*, commonly called the *earth-hog*, which also feeds upon the same insect. Kolben says, they in some measure resemble the hogs of Europe, except that they are somewhat red, their snouts more pointed, and they are toothless: and he says that their flesh tastes much like that of a wild hog. The Hottentots consider their flesh excellent, although it is by some said to have a strong flavour of the acid of ants, derived, of course, from their food. The dried hams made from the earth-hog are spoken of in terms of approbation.

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* Phil. Trans. 1770.

The *Armadillo*, or *Shield-Hog*, a curious little animal, encased in a complete coat of shell armour, is an inhabitant of South America. In its manners it is gentle and harmless. They are hunted with trained dogs, or dug out of their burrows. When attacked, this animal either betakes itself to the hole in the ground which it has already inhabited, or with great celerity makes a new one; or, having attained its burrow, it continues scratching in the ground and penetrating farther in. In its resistance to be pulled out, it often holds so fast that the end of the tail is pulled off. It often escapes from its pursuers by rolling itself up in a ball and throwing itself down any declivity. These animals are never seen to drink. The flesh of the a[illegible]adillo is fat and delicate. In Buenos Ayres, Brazil, and Guatimala, it is sought after with avidity: the old animal is musky and unpleasant, but the young is considered delicious, and similar to sucking pig; Trevoux says it is more delicate. The eight-banded armadillo is superior, as food, to the three-banded. One of the nine-banded armadilloes brought to England, nearly eighty years ago, was the size of a cat, weighed seven pounds, and fed on raw beef and milk.*

The *Rhinoceros* contributes its immense body to the food of man, and its flesh is esteemed in Asia and Africa. It resembles tough pork, but has a musky flavour. Its paws are the chief delicacy, and for these, this large creature is often sacrificed. Paterson says, that in the country of the Hottentots he partook of rhinoceros-flesh which he found good eating, it being very young and tender.† The rhinoceros exhibited in Red Lion Square, in 1739, was a gentle creature; and, notwithstanding its unwieldy shape, was remarkably active.‡

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* Phil. Trans 1764. † Narrative, p 95 ‡ Phil. Trans 1743

The *Elephant*, of all animals, might least be supposed to furnish tolerable food. His gigantic bulk, thick impenetrable skin, and the enormous strength of his muscles, might lead to a supposition that so firm a fibre must be rank and indigestible. Yet various testimonies show that this would be an ill-founded conclusion. The hunters of Abyssinia and other parts of Africa value it as a prime delicacy. It is eaten in Sumatra. (*Anderson.*) In the kingdom of Dahomy it furnishes a favourite repast. The Pholeys, who inhabit some countries adjacent to the river Gambia, hunt elephants for their ivory and flesh; the latter, as Dr. Moore informs us, is preserved for food by drying and smoking, and will then keep for many months. Kolben describes the Hottentots' method of capturing this animal. They sink a pit six or eight feet deep, and cover it with boughs and grass, having previously erected in the middle of it a strong pointed stake. The elephants having to cross this track in going to the water, one generally falls into the trap, and being pierced by the stake, his whole weight rests on it, and the wound, assisted by the blows on the head then given him, causes his death. His body, afterwards cut in pieces, affords at least a plentiful repast to the captors. They preserve what they do not want for immediate use by drying. Throughout Hindoostan and China, the flesh of the elephant is used as a medicine. It is said that the trunk is particularly nice; and Pliny says, that the grisly part of it was in his time highly prized. The feet are also valued as a delicacy.

When the elephant, which was exhibited in London in 1826, at Exeter 'Change, was killed on account of his becoming intractable, two large rump-steaks were cut off and broiled. Several persons present, male and female, partook of it, and declared it was pleasant meat.*

One of the Hindoo Shastrus gives the following direction for selecting a wife:—Let him choose a girl "who walks like a young elephant." In Europe, to compare a lady's gait to that of an elephant, would be considered a doubtful compliment.*

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* Mirror, vol. vii.

The *Walrus*, called also by the several names *Morse*, *Waltron*, *Sea-Horse* (*Woodward*), an animal somewhat resembling a seal, is hunted for its ivory, oil, and hide. Its flesh is of a dark red colour: it is eaten by the Esquimaux, and preferred to that of the small seal. A very large walrus will sometimes weigh 4000 pounds. Its hide, which is an inch thick, may be used as leather for many useful purposes. From one walrus about half a ton of oil is obtainable.

Dr. Richardson says, that a moderate-sized female walrus, killed by Captain Parry's men, weighed 1736 pounds. The crew feasted on the heart and liver, which they pronounced excellent. The tongue is good when fresh, but becomes oily by keeping. The feet or fins are considered delicacies by the Esquimaux. A heart weighs eight pounds.

Manatee (whale-tailed), or *Sea-Cow*, is a very large animal, sometimes measuring nearly thirty feet, the forepart of which resembles a seal. It has two fore paws or clawed fins; but its hinder parts are destitute of paws, concealed or external; and the tail is long and spread out. It inhabits chiefly the mouths of the great rivers of America and Africa. It is herbivorous; and may be seen swimming, with its head above water, cropping grass and weeds on the shore. They are harmless creatures, and do not fear the approach or even touch of man, until they acquire experience of his acts. They are an interesting example of connubial fidelity and attachment: the male has been known to follow his wounded mate, and to watch beside her remains with the most tender solicitude; and if she be killed, he will follow her dead body to the place where it is landed, and hover about the spot for several days. The female brings forth but one at a birth; and this with her clawed fins she presses to her bosom, with all the affection of a human being, and suckles at her breast. The young one, not insensible to her attentions, has been said to shed tears when taken from its dam. Both parents conduct their young along with them wherever they go.

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* Ward on the Hindoos, iii 105

The milk of the manatee is rich; the fat has a fine flavour; and when exposed to the sun, becomes yellow like butter, and is often used as such. The flesh, which resembles beef or veal, is less apt to give way to putrescency than these meats. As this animal grazes, and affords milk, butter, and beef, it is no wonder that it has been called the sea-cow. The crew of Columbus, when on the coast of Mexico, used the manatee as food, and compared it in taste to veal: others attribute the veal flavour to the flesh of the young animal only, and the fat they compare to pork. The Indians on the shores of the Carribean sea, consider it excellent food. The king of Malaya claims, as a royalty, all the animals of this kind taken on the coasts of his dominions.

The flesh of the Orinoko manatee is wholesome, white, and delicate. The tail of the young female is said to be particularly nice; but a suckling roasted is described as delicious. The flesh of the manatee of other rivers has been represented as having the flavour of beef; the colour being redder, and the texture coarser.

Order IV. FERÆ.

The *Seal* is one of the most singular, interesting, and in some countries useful of the quadrupeds. It is five or six feet long; and has four exceedingly short feet, each terminating in toes and sharp claws. These feet are almost concealed under the skin, and the toes are connected by a membrane; on account of which construction they are admirable swimmers, and well calculated for the capture of fish, on which they subsist. The body is thickly covered with short hair, longer towards the tail; and the animal has whiskers. It lives chiefly in the sea, but sleeps on shore, and basks in the sun.' Its head resembles that of a dog, and it has the good-natured expression of that animal. It is an affectionate mother, suckling her young with great anxiety, and is ever ready to render up her life in its defence. A seal is a playful intelligent animal, and easily tamed when young. It then becomes quite domesticated; forms attachments to human beings; and lives in the house with its protector, occasionally going into the sea to fish, and returning. With this excellent disposition seals have been found so fierce as to attack men, and place their lives in great jeopardy. Capt. Rogers, the circumnavigator, was attacked by one of these at the Gallipagos islands: it came open-mouthed to him, and seemed as fierce as a mastiff-dog. The captain defended himself with a pike which he stuck in the animal's breast: the seal retired and returned, received three wounds, and then finally retreated, snarling and showing his long teeth out of the water. The seal is very tenacious of life: it is, however, easily killed by a stroke on the nose. While skinning, a seal has been known to turn on and seize the heartless being who subjected it to such a process while still alive.

Seals are inhabitants of all parts of the ocean, and frequent those shores in great numbers, where nature has bestowed her favours with a sparing hand. Without this creature, the few sources of precarious subsistence open to the inhabitants of the Arctic regions, would be dangerously curtailed; and one of the most abundant, certain, and easily attained supplies, not only of food but of almost every other necessary, would be withdrawn from nations that could least afford the loss. To the half-famished inhabitants of northern climates, the seal is both food and raiment. The flesh, often half putrid, is his common diet; the oil his only condiment. With the skin he clothes himself, and sews it with the sinews. The wooden frame of his canoe is also covered with the skin. Of the gullet he sometimes makes trowsers and boots. The transparent intestines, dried, are used as glass for the windows of his house. The oil, beside being used as food and drink, is burned in lamps, the heat and light of which tend to dissipate the dreariness of the lengthened night, during which nature herself seems to sleep: a young seal yields about eight gallons of oil. No part of this useful animal is waste.

The taking of seals is therefore the chief occupation of these hyperboreans. "The first seal (says Lord Kames) that a young Greenlander catches is made a feast for the family and neighbours. The young champion, during the repast, discants upon his address in catching the animal; the guests admire his dexterity, and extol the flavour of the meat. Their only music is a sort of drum, which accompanies a song in praise of seal-catching."

According to the accounts of those who have eaten seal's flesh, that of some species is no despicable food, while that of others is far from enticing. The meat of the female ursine seal, which is the favourite of the Kamtschadales, has been compared to lamb, being white and delicate; the young animal is said to have the flavour of a sucking pig. The old male ursine seal is by no means desirable food, being coarse and nauseous. There are a few species, the quality of which is very inferior, the flesh being red and rank. Of the feet of the seal a nutritious jelly may be made. The fat resembles that of mutton. Anson's men, who at first spurned seal's flesh, at last when tired of fish, condescended to eat it at Juan Fernandez, and by degrees became very fond of it: they compared it to lamb. Captain Rogers's men ate them at the same island, and thought them as good as English lamb. Sir Francis Drake found seals on the coast of Brazil which proved wholesome food, although not very palatable. Lord Anson gives an interesting account of a species of seal which he calls sea-lion (*Phoca leonina* Lin.). The ship's company relished its flesh, and compared it to beef; they prized their tongues and hearts particularly, and preferred them to those of bullocks. These unwieldy creatures contain an enormous quantity of blood; one whose blood was measured, afforded more than two hogsheads. They are sometimes, twenty feet long, and fifteen in circumference. When the skin is cut, which is an inch thick, a foot of fat must be cut through before the lean is reached. One animal yields a butt of oil.

Seal's flesh was once a favourite in England, at the celebrated feast given by Archbishop Nevill there were a number of them served up, along with porpuses.

The *Dog*.—The domesticated dog is the noblest of all quadrupeds. The faithful companion of man, he is chief actor and participator in many of his amusements. A fiducial servant, he is the fearless defender of his master's life, and the incorruptible guardian of his property. A disinterested purveyor, he procures food of which he does not partake, and pampers his master's appetite, while he is himself satisfied with the meanest fare. Often has he been the instrument of justice, and by his unerring scent has traced out the lurking murderer when human perceptions were inadequate to his detection. He is eyes to the blind, and limbs to the lame. His friendship is ardent and lasting. Kindness produces in him a devotedness of attachment that is not found in beings of higher pretensions, and relaxation of ill-treatment, is received with gratitude for the present, and oblivion of the past. Beside being a useful friend, he is an amusing acquaintance, lively, arch, and frolicsome even to declining years, he seems to enjoy with a hearty relish the sport which he creates; and he exults in a display of the education which his docility and intelligence qualified him to receive. In the dreary regions of the north, where the stunted productions of the earth refuse sustenance to other animals, he is content; and his fleet and firm limbs convey his master, with the swiftness of an arrow, across the polar snow. His services do not end with his life; for his dead body contributes a feast to those who had reared and protected him.

In our own quarter of the globe, we contemplate the eating of dog's flesh with no small degree of repugnance. We forget that the most luxurious nation of antiquity did not disdain the flesh of man's faithful companion. The Romans not only ate puppies, but considered them food for the gods, and deserving of the highest honours which the complex art of the cook could bestow on them, and they were made into delicate fricassees. Nay, this is said to be still occasionally done in Britain.* Hippocrates and Galen have added the weight of their authority to the opinion that dog's flesh is wholesome and nutritious. In the kingdoms of Whidaw and Dahomy, the flesh of dogs is so much esteemed that it is sold in public markets; and in the latter country dogs are actually fattened for the purpose of food. The natives of Owhyhee and Otaheite, even the better class of them, very much prize this kind of meat; and it was once common amongst the comparatively civilised Mexicans. In the Society Islands, dogs were crammed, as poultry with us, for the sake of improving their flesh. The Chinese, as well as the Cochin Chinese, at this moment, do not behold with contempt a nicely cooked dog. In China the trade of a dog-butcher is common; and it is said, that his employment is fully understood and duly appreciated by the dogs: the moment one of these personages appears in the streets of Canton, where a number of residences are allotted to them, the rumour spreads amongst the dogs, and the butcher is beset by them, and barked at on all sides, until he makes good his retreat. The Calmucks, the mountaineers of Asam, and the Tonquinese, amongst their extraordinary predilections, are much attached to roasted dogs. The negroes of Guinea are great admirers of their flesh, and prefer it to that of their cattle: the dogs there are remarkably ugly, and it is curious that the European breed soon degenerate there into equal deformity, and lose their bark.

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* Encyclop. Edinensis

In ancient times, dog-eating was very prevalent. The Carthaginians practised it; and Dr. Shaw says, that the inhabitants of a district in the eastern province of Barbary continued to indulge in it. The Canarii, or ancient inhabitants of the Canary Isles, received their name from *canis*, a dog; because they fed on it. The people of Manduria, a city of Calabria, were notorious dog-eaters.

Pliny says, that the ancient Romans considered the flesh of sucking puppies so pure and fine a meat that they sacrificed them to the gods; and at their solemn festival suppers served them up as food. Young dogs' flesh, he says, was an ordinary dish at those sumptuous feasts called *Aditiales*. Because the dogs which had the custody of the capitol did not bark when the Gauls scaled the walls, it was the custom of the Romans to crucify some of them annually, and hang them alive upon an elder tree, as an example of justice.

On a late occasion, the police of London detected a man, if such he could be called, in the act of skinning a dog alive, for the sake of his hide. He held the dog firmly between his knees, while he detached the skin from its adhesions. The wretched sufferer, obliged to submit to this diabolical treatment, uttered no cry; but his quivering flesh evinced the torture that he experienced; and when he was let down, he dragged his miserable skin, partly adhering to his body, and partly trailing on the floor, in an agony which needs no description. Yet the law, which until lately awarded the punishment of death for comparatively trivial offences, inflicted on this monster a small fine.

The *Wolf*, as far as I can discover, is not used as food by any nation of the globe, except the Laplanders, and by them only when compelled by the greatest necessity. The wolf devours those of his own species: if one be wounded, the others will track him by the scent of his blood, and when found his fate is certain. This animal has a strong passion for human flesh.

The *Hyæna*, a native of the torrid zone, is not inferior to the lion and tiger in courage; in cruelty and rapacity he stands unrivalled; and in indomitable ferocity he is paramount. He will attack most animals, and will defend himself against all. His whole life is an alternation of starvation and gluttony; and he scarcely looks at any other creature, but with the design of making it his prey. Indicative of his dispositions and propensities, his head has a downward inclination. With slouching gait, sinister look, and fiery eye, he runs along, his nose almost touching the ground, so eager is he in the scent of blood. This scent he will pursue with the unwearied assiduity which his hunger or love of carnage prompts; and once successful in discovering his prey, hungry or satiated, no mercy need be expected. As might be supposed, he does not spare man: dead or alive he is equally acceptable; and if dead, the feast is not the less relished because far advanced in putridity. This foul creature infests the field of battle or the graveyard; scrapes away the earth, disinters the decaying body, and immediately commences his detestable banquet. In time of pestilence when burial places are rich in mortal remains, the hyænas are sure to profit by the general calamity.

Yet with such propensities to the vilest food, this obscene animal is used as meat by a few nations of the globe. But the Arabs say, that it has the property, when taken as food, of causing stupefaction; a statement which may fairly be doubted. In common with other hard and tough flesh, it may be not easily digestible, and it may thus produce heaviness and drowsiness for some time after having been made use of; and probably this is the extent of the injury which it is capable of occasioning.

The *Jackal*, the foulest of all animals, in form very much resembles the fox, and has the same bushy tail; but in propensities is scarcely equalled by the hyæna. It is said, that their taste lies in human flesh; and that having once partaken of it, they for ever pursue man living or dead, it being no objection if his remains are in the last stage of putrefaction. Commodore Roggewein says, that the jackals of Ceylon were so greedy after human flesh, that they tore dead bodies out of their graves; and that to prevent this terrific exhumation, a great stone, covering the whole surface of the grave, was generally laid over it when first made. Yet familiar as the natives were with this fact, he says that consumptive persons ate their flesh, and sometimes with good effect. Baldæus had already stated the same facts. That the practice should be resorted to, and with advantage, would be less surprising in some nervous diseases, the influence of imagination being the real agent.

Lieutenant Paterson says, that a certain tribe of Hottentots use the flesh of these hideous animals as common food, and dress themselves in their skins. But this is the less to be wondered at; for he tells us of a Hottentot who, being hungry, stole the shoes of his companions, and ate them.*

The *Fox*, a rank and disgusting animal while alive, is nevertheless sometimes used as food, and is not without its admirers even in Europe. As every one knows, Renard is fond of grapes, his depredations are notorious, and he fattens on his plunder But he suffers by this improvement in his condition, for it is then that he becomes fit for the table, and falls a sacrifice.

The Arctic fox, when young, is considered even a great delicacy, being white and well flavoured. Dr. Richardson says, that it resembles rabbit in flavour, and is equally delicate. Captain Franklin's party agreed with Hearne †, in comparing the flavour of a young Arctic fox to that of the American hare. Capt. Lyon conceives that it resembles the flesh of a kid; but the party of Capt. Ross, who were the first to taste them, named them *lambs*, from their resemblance in flavour to very young lamb. Captain J. C. Ross says, that they constituted one of the principal luxuries of the table, during the expedition of Captain Sir J. Ross, "and were always reserved for holidays and great occasions; we ate them boiled, or more frequently, after being parboiled, roasted in a pitch-kettle." * He adds, that the flesh of the old fox is by no means palatable; and the water it is boiled in becomes so acrid as to excoriate the mouth and tongue. The average weight of the male Arctic foxes is seven pounds and a quarter; of the females, five pounds and eleven ounces. The Hare Indians, the Greenlanders, and the inhabitants of Bornou eat fox-flesh.

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* Narrative, 116–120

† I find, on referring to Hearne, that he compares its flesh to rabbit in taste but Forster says that the American hare is called rabbit at Hudson's Bay

It has been affirmed, that the Laplanders, who devour almost every animal within reach, reject the fox, unless when they are pinched by actual famine. Captain James saw sufficient to convince him that, in the Island of Resolution, fox-flesh broiled is used as food. A practice of the ancient physicians was to heat a live fox in oil, and bring it to a boil. This oil was considered a remedy of many virtues, and capable of doing wonders. (*Serapion.*)

Mr. Hearne says, that the arctic foxes, when they find one of their own species caught in a trap, devour it. The northern Indians about Hudson's Bay do not eat the flesh of foxes, wolves, or ravens, unless urged by necessity; for as these people do not inter their dead, these animals devour them, and thus do a great and general service.

The arctic fox is a very different animal from the common fox, in point of cunning The former are known to stand by while a trap is baited for them, into which they put their heads immediately.†

The arctic fox, in its snow-white winter fur, is well secured against the intense cold of the climate, by the thickness and length of its hair, which is at the same time as soft as silk.

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* Appendix to Second Voyage.

† Phil Trans 177[illegible]

The *Lion.*— In this order the monarch of the forest presents himself, pre-eminent in size, strength, courage, and ferocity. Possessed of such a formidable combination of qualities, this most terrible of all wild beasts, as he is in a state of nature and unawed by experience of the power of man, may be reduced to a state of obedience, and rendered gentle and submissive. He is courageous only in proportion to his success; defeat makes him cautious, and reiterated repulses render him a coward. His form is the very model of strength and agility; in his proportions there is nothing redundant, nothing curtailed. ‘Majestic in his deportment, he is noble in his disposition; and if he is superlative in the power of doing harm, he is, unless in his own defence, merciful in the use of it. When urged by famine, he will attempt all things, and succeed in most of his attempts: he is then terrible and irresistible; he will spring with an elastic bound of overpowering force, seize his prey, and with a tremendous roar give a death blow which seldom leaves a necessity for a second. His hunger appeased, he retires to the thicket, and is temporarily divested of his ferocity: he will no longer attack unless attacked, for he is not cruel by nature, and he slaughters no more than is necessary to satisfy the cravings of appetite. In this state of quiescence, man may for the most part approach him with impunity. No prudent person, however, would intrude upon his privacy, or try how far such intrusion would be endured; the temper of the king of beasts is rather uncertain, and he does not always apportion the punishment he inflicts to the degree of offence. Kolben says, that if the lion neither shakes his mane, nor lashes with his tail, a traveller may pass him in safety. ‘Notwithstanding the strength and courage of this huge creature, man readily enters the field against him; and four experienced persons armed with spears are almost always sufficient, if they possess the necessary dexterity, to encounter him with a successful issue. But it is not always in open war that the lion falls a victim; stratagem is much less dangerous, and is often employed against him. In some parts of Africa, the method practised is to dig a deep pit, and to cover its mouth over with branches of trees and reeds. When the royal prisoner is thus entrapped, it of course is not difficult to despatch him. Dr. Shaw informs us, that the lion is supposed to prey chiefly on the wild boar; but he adds, that the latter often defends himself with such fury, that both the combatants are found dead and dreadfully mangled.

Coarse and tough as the flesh of the lion might be supposed; it affords a meat which has been spoken of in terms of high commendation. The negroes devour it with avidity; and the relish is said to be mutual, the lion having a particular *penchant* for a negro. The Algerines hunt him and eat his flesh, although their dogs refuse it. By some the flesh is compared to venison; others discover in it a resemblance to veal. It is not easy to conceive how it can partake of such opposite flavours as those of veal and venison; and it is much more probable that, if there be any resemblance, it is to the latter only.

The *Tiger*, a beautiful but ferocious, cruel, and indomitable animal, resembles the lion in none of his noble traits of character, and does not possess one redeeming quality. His strength is enormous: he easily seizes and runs off with a buffalo. With such strength and ferocity his aggressions upon other animals are unceasing, and by no means limited to the object of supplying his wants. He slaughters every creature in his way that he can master, and there are few that he cannot easily overcome; yet he is a coward, and prefers an ambuscade to an open attack. When his hunger is appeased, he continues his murderous career to gratify the malignity of his propensities; and blood seems to be the chief object of his life, for he literally drinks it with avidity. The following summary of his character has been given by Dr. Goldsmith: — "The tiger is the only animal whose spirit seems untameable. Neither force nor constraint, neither violence nor flattery, can prevail in the least on its stubborn nature. The caresses of the keeper have no influence on its heart of iron; and time, instead of mollifying its disposition, only serves to increase its fierceness and malignity. The tiger snaps at the hand that feeds it, as well as that by which it is chastised: every object seems considered only as its proper prey, which it devours with a look; and although confined by bars and chains, still makes fruitless efforts, as if to show its malignity, when incapable of exerting its force."

With such a character the tiger is universally abhorred. Kolben says, that the death of no wild beast occasions such joy in a Hottentot village, as that of a tiger. He states that the Hottentots are excessively fond of its flesh, and that he himself found it to be most delicious food, and much superior to the finest veal. Many persons will, probably without tasting tiger's flesh, feel disinclined to the preference given by Kolben to it over veal, but we may judge from the passage that there is some resemblance between the two meats. The negroes on the coast of Guinea are exceedingly partial to the flesh of the tiger, and banquet on it as often as they can. This favour is amply returned by the tiger, for of all animal food he is said to eat that of man with the greatest relish. Yet the extraordinary fact has been stated that, notwithstanding this predilection, his disgust to a person labouring under small-pox is so great, that he will not touch his flesh. In Sumatra tiger's flesh is eaten; but as rats are also eaten, this is less to be wondered at, (*Anderson.*)

The *Leopard* very much resembles the tiger, both in appearance and habits. Like the cat, he creeps on his stomach until he has got so near his prey that a bound will enable him to pounce on it. This animal is chiefly found in Africa. Its skin is much valued. There is a species called hunting leopards which the Persians train so admirably, that they will start and take a hare as well as a greyhound, and are as much under authority as a setting-dog. A kind of deer are also hunted with them. There is, at this moment, a remarkably fine hunting leopard in the menagerie of the duke of Devonshire from India, where they are commonly used.

The flesh of the leopard is white like veal, and is said to be exceedingly palatable. The negroes of Guinea take them in pitfalls, and use them as common food.

The *Cat.* — Amongst the cat kind it will be proper to take some notice of the domestic cat, which by some nations is eaten without the least disrelish, and, abating all prejudice, may be delicate food. Several nations of the east, as the Tonquinese, Calmucks, &c. make use of them thus, and a traffic is carried on in their furs in other countries, amongst the rest in England and France occasionally. About a year since, this subject was investigated in a London police office. A person who made cat-skinning his trade, was detected with twenty-nine cat-skins in his possession, and the several implements used by him were discovered in his filthy abode. It appeared that he was in the habit of turning the bodies of his poor victims to account as well as their skins; for he roasted them over the fire to obtain their fat, and after this he sold their bones. Such was the treatment to which this little domestic favourite, purloined from its home, was subjected by this execrable being. If there were no purchasers of such articles, obtained as they obviously must be by the worst means, no such trade would exist.

The ludicrous insinuations of Le Sage, relative to the substitution of cats for rabbits, are not fictions, for we have it on good authority* that in Paris the bodies of cats and dogs are often substituted at table, for those animals which they resemble in size.

Very different was the treatment of the cat in ancient Egypt. Diodorus Siculus says they were worshipped; and Herodotus gives an account of the pious care taken of them. He says, that when a fire happens amongst the Egyptians, the fate of the cats is a matter of pious solicitude; for the people, allowing the conflagration to consume what it may, range themselves so as to take best care of the cats; while these, to the infinite grief of the people, slipping aside, or leaping over the heads of their protectors, tumble into the flames. In whatever house a cat dies a natural death, all the inmates shave their eyebrows; but when a dog dies, they shave entirely. Dead cats are taken to the sacred asylums at Bubastis, where they are embalmed and receive sepulture, but dogs are buried in the consecrated repositories of their own cities. Cambyses took Pelusium with an army of cats and dogs, for the pious Egyptians refused to fight against their divinities.

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* Bulletin Universel

The *Common Otter* is an animal which, infesting the banks of rivers, lives chiefly upon fish, after which it is an expert diver. It is a very destructive resident near rivulets and fish-ponds, as it seems to give a preference to the head of the fish, while it leaves the body untouched; and hence the animal is industriously destroyed wherever met with. Its flesh is eaten by the Laplanders, the American Indians, and others. The otter has so remarkably fishy a flavour, and spends so much of its time in the water, that the brotherhood of the Carthusian monastery at Dijon, prohibited from the use of animal food, were permitted to eat its flesh on *maigre* days. Dr. Goldsmith saw an otter so well trained that, at the word of command, it went into a pond, drove the fish into a corner, and seizing the largest, brought it off in its mouth to its master. Herodotus says, that otters were deemed sacred amongst the Egyptians.

The *Sea Otter* is an interesting animal, on account of its devoted affection to its offspring, and its harmless disposition. If deprived of its young, it will pine away, and die on the spot where its last attentions were bestowed. In general it is lively and frolicsome, and so affectionate to its own species that they are said to fold their arms round each other and kiss. The sea-otter is a large animal, measuring three or four feet in length, and weighing seventy or eighty pounds. When young, its flesh is so delicate as to be difficultly distinguishable from a sucking lamb. It lives upon shell-fish. A sea-otter described in the Philosophical Transactions, 1796, measured upwards of four feet from the nose to the extremity of the tail; its circumference (for it is nearly the same thickness throughout) was 28½ inches. The fur is silky and beautiful. The head is small and somewhat compressed; the eyes are small; the whiskers are white, strong, and numerous.

The *Marten*, an elegant little carnivorous animal, an inveterate enemy to cats, and capable of vanquishing the wild cat, is, notwithstanding its musky smell, eaten in some countries.

The *Weasel*, an active, courageous, and ferocious little creature, preys on animal food, which, however, it sets but little value on, unless semiputrescent. Some species are eaten.

The *Skunk*, or mephitic weasel of North America, has the remarkable property of defending itself when attacked, by evolving a smell, so detestable, that no animal can endure it. This is diffused for half a mile round. Whatever is infected by it acquires so permanent a taint, that it is scarcely possible to remove it. Mr. Hearne says, that a place where two of them had been killed, remained still intolerable, after a whole winter and spring.

Yet this disgusting creature has been used as food by the native Americans; and Hearne says that, if properly cleaned out, the flesh is not tainted. In order to render them endurable, they are first irritated until the whole of this fetid liquor is exhausted; and when killed, the secreting glands are immediately cut out.

The *Stifling*, or mephitic weasel of South America, inhabits Mexico. When pursued, it evolves so abominable an odour that even dogs unwillingly continue the chase, and are obliged to recover themselves, at intervals, by keeping their noses close to the ground; a dog that kills one, cannot be endured in the house for several days. If one of these repulsive animals be killed in a house, there is danger of absolute suffocation to any one obliged to endure it, and there are cases of this kind on record. Notwithstanding this, the flesh of this appositely named creature is not only eaten, but considered good food, and is said to resemble pig. It is absolutely necessary that the stifling, as soon as killed, should be skinned, and one of the internal parts removed.

The *Bear* constitutes an article of diet with many nations, and even in Europe some parts of it are esteemed. The natives of the polar regions, and the lower orders of people in Norway and Russia, invariably eat the flesh, and think themselves fortunate when the pursuit of the animal is successful. The Kamtschadales think it such a luxury that, when it is to appear at their tables, they invite company. The paws of the adult brown bear, and also their hams, especially when smoked, are considered a great delicacy. In autumn the animal, by feeding on acorns, is fat and in its best condition; it is then excellent food. The flesh in its fresh state has been compared to beef; but the meat of the white or polar bear is said to resemble mutton in taste: others have represented the polar bear as too strong for food, on account of its feeding on fish and seals. The cubs afford nicer meat than the adults. The weight of a large polar bear was found by captain J. C. Ross to be 1028 pounds.

Sir John Ross states some facts which seem to show, that the flesh of the polar bear is by no means wholesome. He says, that several of these animals having been killed by his people, some of the party, tempted by the fine appearance of the meat, made a hearty meal off the first one that was shot. All that partook of it soon after complained of a violent headach, which with some continued two or three days, and was followed by the peeling of the skin from the face, hands, and arms. On a former occasion, sir J. Ross had witnessed a somewhat similar occurrence when on sir Edward Parry's polar journey; the party having lived for several days wholly on bears' flesh, the skin peeled off their feet, legs, and arms.* It was then attributed rather to the quantity than the quality of the meat, and to their having been for some time previously on very short allowance of provision. The Esquimaux eat its flesh without experiencing any such inconvenience: but the liver is always given to the dogs, and that may possibly be the noxious part. The case of three sailors is on record, who became dangerously ill in consequence of eating part of the liver of a white bear.

It is a curious fact that, although the Esquimaux eat the flesh of the bear without reserve, the Northern Indians will not touch it. (*Dr. Richardson.*)

Mr. Long mentions the curious fact that a bear's skin, freed from the hair and roasted, tastes like pork.†

Mr. Hearne observes, that the flesh of the black bear is excellent eating after the middle of July when the berries begin to ripen, and so continues until January and February. But late in spring, in consequence of long fasting, it is poor and dry. In June, he says, it is abominable.‡ Although rare in Europe, the black bear is common in the forests of America.

The *Badger* is a harmless, inactive, and drowsy animal. The hunting of it was formerly a fashionable sport in Britain, but is now scarcely practised. Its hinder legs are sometimes made into hams; but though the flesh is fat, its taste is rank. In China, the whole animal is commonly eaten, and its flesh is sold in the butchers' shops of Pekin, the Chinese being fond of it.§

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* Appendix to Second Voyage.
† Trav. in N. America.
‡ Journey, 370.
§ Bell's Travels.

The *Racoon*, is a lively, restless, and inquisitive animal, "extremely fond of sweet things, and strong liquors, and will get excessively drunk." (*Pennant.*) He is said to be an expert fisher for crabs, using his tail for the line, and its tip for the bait. When he feels a *bite*, he jerks his tail with the crab on the end of it on land, with all the dexterity of a fisherman who bobs for eels, and shows little mercy to the offender. It is a habit of some of the racoons to dip their food into water previously to making use of it. The racoon is eagerly sought as food by the negroes and the North American Indians.

The *Glutton* is a fierce and voracious quadruped, about a yard in length from the nose to the end of the tail, with disproportionately short legs. By some it is considered of the badger kind; by others, of the bear kind; and by others it is thought to have most relation to the weasels. Be this as it may, it is a singular creature, and its name is not misapplied. The following account has been given of its habits:—On the branch of some tree which, from the marks of the teeth and antlers of the deer, it judges to be the occasional retreat of that animal, it patiently awaits the arrival of its prey. When the deer passes under, it darts down on the animal, sticks its claws firmly between the shoulders, and remains obstinately fixed, notwithstanding the efforts of the deer, by rushing through the thickest woods, to dislodge its determined tormentor. The glutton, although part of its skin may have been thus torn off, contentedly pursues his occupation of eating his way through the neck towards the blood-vessels. When at length the deer falls dead, his tenacious companion lies beside him, gorged and unable to stir or defend himself, but protected by his abominable odour from the encroachment of other animals.

This animal is hunted chiefly for its beautiful skin; but the Laplanders, who are by no means over nice in their fancies, make their banquet of its flesh, and their profit of its fur.

The *Kangaroo* is an Australian animal, inhabiting the west coast of New Holland, much used as food, and having some resemblance to mutton, or, as some say, to common venison. When young, it is a good meat; but when old, it is coarse and tough. It grows to the weight of 140 pounds. It is a timid creature; and when alarmed, escapes with a celerity which no greyhound can overtake: its motion consists of astonishing leaps, seven or eight feet high. The weapon of the kangaroo is his tail, and with it he will defend himself from the most powerful dog. This animal begins to disappear in Australia, so much has it been preyed on as food.

The *Opossum*. The flesh of some of the opossums is white and well-tasted. It is extensively used in those countries where these animals abound; they are found in America, in India, and in the islands of Amboyna and Banda. In some countries their flesh is considered a great delicacy, but the flavour varies with the species. Some that have been called opossums resemble rabbit in taste, others, as those of Cayenne, are like hare; and others are best compared to pork. Of this last kind the young ones have the flavour of sucking pig. The Molucca opossum is a delicacy at the tables of the great; the young ones are reared in the same place where they keep rabbits.

The *Wombat*, an animal having a little resemblance to a small bear, but gentle and timid in its manners, is an Australian quadruped used as food; but we have no accounts of its flavour or nature. The same may be said of the Koala.

The *Hedgehog* contributes to the list of aliments of some countries, and is sometimes much esteemed. In Barbary it was considered a princely dish, and great pains were bestowed on the cookery of it. It is eaten by the Spaniards during lent. It is also used in Candia and Madagascar. Albertus Magnus communicates the important secret that, if the right eye of this animal be fried in oil, and this oil be used as an ointment to the human eye, the person so using it will be able to see in the dark. Such are the absurdities that once passed current.

The meat of this creature is represented by travellers as tasteless and soft. It lives on insects: it will without injury eat 100 cantharides, a quantity that might poison forty or fifty men.

Order V. Glires.

The *Porcupine*, no very inviting animal in appearance, is nevertheless said to be an excellent article of diet, and is much valued in some countries. In Labrador, they are numerous and are commonly made use of. The American Indian hunts the Canada porcupine, and in some seasons almost depends on it for food: the quills are to him also an object, as they furnish him with an ornament. Mr. Hearne says it is delicious eating. They are eaten roasted by the Brazilians, the Brazil variety being generally fat and its flesh white. The negroes of Guinea make great use of them. The porcupines, says Kolben, at the Cape of Good Hope are often two feet high, and three feet long. As they do great mischief in the gardens there, they are often killed in the following manner:—When the breach is discovered through which he enters, a musket loaded and cocked is placed opposite it. A string tied to the trigger is led along the barrel to the muzzle, where a carrot or turnip is fixed. The porcupine, by taking this bait, pulls the trigger and is shot. Their meat is white, fat, and sapid, and is thought to be very wholesome. They are sold in the public markets of Rome. Mr. Jesreel Jones says, "I have eaten porcupine stewed, which much resembles camel's flesh in taste, and that is the nearest to beef of any thing I know."

The Europeans are very fond of the flesh of the Canada porcupine; when roasted, it tastes exactly like sucking-pig.*

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* Philosophical Transactions, 1772.

The larger kinds of snake are great destroyers of porcupines; they devour them, and both animals are destroyed. The snake seizes the porcupine by the head, and sucks it in; the quills, which were flatted down while the body was going in, afterwards become erect, run through the snake's body, and kill it. A monstrous snake has been found dead, with the quills of the porcupine sticking through his body.*

The *Guinea-pig*, a very pretty little animal, well known to most persons, is bred in this country as an ornament and sometimes for food. In its manners it is rather stupid, and does not possess sufficient intelligence to render it interesting. As food it is not attractive, and is rarely used.

The *Agouti*, a small animal about the size of a rabbit, somewhat resembling both the squirrel and the rabbit, is found chiefly in South America. It holds its food in its forepaws like a squirrel. When fat and well fed, it is prized by many persons, notwithstanding its peculiarity of taste. It is sometimes roasted like a sucking pig, and sometimes as a hare with a pudding in it. It is rather a tough morsel. Agoutis were formerly much more abundant than at present.

The *Musk Beaver*, notwithstanding its strong musky flavour, is much relished by the North American Indians. Its taste is said to resemble that of ill-fed pork. Mr. Pennant † says, that the musk beaver has been supposed to owe its strong flavour of musk to the use which the animal makes of the *acorus calamus* or sweet flag as food. It is observed that the animal loses this smell in winter, probably because the plant is not then to be procured.

The *Castor Beaver*, the animal which affords the medicine called *castor*, has also a strong odour; and notwithstanding this, it is used as food by the Laplanders, who are happy to procure it. They preserve it by taking out the bones, and drying and smoking the flesh.

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* Philosophical Transactions, 1746.

† Arctic Zoology.

Captain Ellis says*, that the flesh of the beaver about Hayes's River is very fat and delicious.

The *Rat*, a well-known pest, is sometimes eaten as a matter of necessity by persons who endure the pains of hunger, and would at another time shrink from such a meal, although by some nations it is considered not bad fare. In 1741, admiral Don Joseph Pizarro in the ship "Asia," was with his crew reduced to the utmost distress at sea. Such was the famine that, when one of the sailors died, his brother who lay in the same hammock with the corpse, concealed his death in order that he might receive the dead man's allowance of provisions. During this period a single rat sold for four dollars.

De Lery tells us that, during his passage home from Brazil to France, the people on board endured a dreadful famine. After devouring every thing, even the horn out of the lanterns, they thought of catching rats and mice which ran about in great numbers famishing with hunger. They laid traps for them, pursued them, and watched them like cats. Whoever caught one valued it more than he would an ox upon land; and two, three, and even four crowns a piece were paid for one The ship's barber was so fortunate as to catch two at once, and a person on board offered to clothe him from head to foot at the first port to which they might arrive if he gave him one of them. The barber, preferring life to dress, did not hesitate to refuse the offer. They boiled the mice without cleaning out the interior. One of the seamen having caught a fat rat, cut off the four paws and threw them on the deck. Another picked them up, broiled them on the coals, and ate them, at the same time declaring that, he never had found the wings of a partridge so savoury.†

Pliny narrates the instructive fact that when Hannibal laid siege to Cassilinum, a rat was sold within the town for 200 sesterces: the man who bought it lived, and the man who sold it died — so much for love of gold.

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* Voy for Discov of North-west Passage

† Histoire d'un Voyage fait en la Terre du Brésil, ch xxii.

The repugnance felt by civilised nations, in times of prosperity, to rats' flesh is a prejudice, to overcome which a less degree of privation is sufficient than might be supposed, as appears by the relations of persons whose experience entitled them to give an opinion. In some parts of the world, no such prejudice exists; and the rat as food is viewed in the same light as any other quadruped; notwithstanding the shudder which even its presence excites amongst Europeans, and the repugnance manifested to it even by dogs and cats. Nay, the rat is in certain countries sought after, as well as its diminutive prototype, the mouse. Rats and mice are amongst the delicacies of the natives of Aracan. The people of Asam, who take nothing amiss, devour rats and mice in abundance. When the supply of fish fails, the inhabitants of the Andaman islands are glad to have recourse to the same dainties. The Kalmucks, more remarkable for a good disposition than for nice habits, do not object to a plump rat. The children of the celestial empire, who consider all nations but their own to be barbarians, are well pleased with a dish of rats. The Tonquinese, second to none in the plainness of their palate, eat this food with great good-will. The people of Sumatra also relish it. (*Anderson.*) The Bedouins, whose wretched condition makes every kind of flesh welcome, consider it no bad fare. The negroes in Jamaica not only eat rats *con amore*, but expend on them some delectable cookery in which molasses is largely used. The rats are there very large; and so numerous, that they sometimes ravage and destroy one-twelfth of the produce of the sugar plantations. Roggewein says, that in the island of Ceylon the tribe *Paruas* fed on rats and mice; but refused cow's-beef, deeming that creature sacred, as the Egyptians did. Our polished neighbours, on the adjoining parts of the Continent, do not look upon a nicely cooked water-rat with contempt: and there, as well as in some other countries, it is eaten as fasting fare; because it chiefly lives upon frogs and fish.

We learn from Pliny that, by the edicts of the Roman censors, and principally by one made by M. Scaurus during his consulship, it was provided that no rats, mice, or dormice, should be served up to table at great suppers and feasts. The Romans must have been much addicted to this luxury, since the interposition of the consular authority was necessary to restrict it.

The rats do not fail to retort on mankind whenever they get the opportunity, either feeding on his deceased remains, or stealing on him during sleep, or taking advantage of his inability to defend himself. Coroners' inquests held on bodies which had remained unwatched, afford continual testimony of the depredations committed on them by rats. Instances have frequently occurred in which a rat has gnawed the toes, fingers, or even the nose and lips, of a sleeping person. The remarkable case of the unfortunate officer is still recollected, who, having descended into a vault under a church, to witness the interment of a friend, and having wandered about, was unfortunately locked up, and found in some time after standing against the wall with his sword drawn, still in the attitude of defending himself, although dead, against the assaults of the rats, by which he had been attacked and much mutilated. The case of the archbishop of Mentz will also probably occur to the reader, who, it is said, having retreated from the rats to a certain tower on an island of the Rhine, was followed thither by them, and at last devoured. These vermin have ferocity enough to attempt any thing, and do not want for cunning to carry their designs into effect. A crowd of persons, some time since, witnessed with great interest the sagacity of a rat occupied in a singular way inside the railing of the Green Park. A cat sat amongst some bushes, in so natural a position, that she might have been imagined to be alive. The rat, however, knew the truth, and was busily occupied in gnawing the remains of his deceased enemy, within a few yards of the crowd; but the animal knew there was a railing between.

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[*] Linnæan Trans. vii. 306.

The *Mus giganteus*, an enormous rat, in shape very similar to the common one, has been described by General Hardwicke.* He says it is found in many places on the coast of Coromandel, in Mysore, and in several parts of Bengal. It is a native of the East-Indies. The lowest caste of Hindoos eat the flesh of this rat, in preference to that of any other species. Captain Hardwicke's specimen was a female, and weighed two pounds, eleven ounces, and a half. Its length from the nose to the extremity of the tail, was twenty-six inches, of which the tail measured thirteen. The male grows to the weight of three pounds and upwards. It is a most mischievous animal: it attacks poultry; its bite is dangerous, and sometimes produces hydrophobia.

The *Labrador Rat* is common in Barbary; and in that country is considered very good eating.

The *Perchal Rat* is abundant in India, and there contributes to the food of the inhabitants.

The *Lemmus Rat*, although commonly supposed to be poisonous, is proved to be not so by the abundant use made of it by the Laplanders. In the taste of its flesh it resembles the squirrel.

The *Musk-rat* is in shape very like a common rat. According to Hearne it is good eating when nicely singed, scalded and boiled.

The *Javan Cavy* (*Mus leporinus* Lin.), notwithstanding its name, is not found in Java; but inhabits Surinam and the warmer parts of South America. It is commonly used as food; its flesh is white although dry. The *spotted cavy* (*Mus paca* Lin.) inhabits Brazil and Guiana. It is fat, and is esteemed in Brazil a great delicacy. Mr. Stedman says, that in Surinam nothing can be better eating. It grunts like a pig. The *Maryland marmot* (*Mus monax* Lin.) about the size of a rabbit is well flavoured and tastes like pig.

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* Linnæan Tr. v. vii. 306

The *Mouse.*—Mice are of course not scrupled where rats are fed on, which is not to be wondered at when the greater cleanliness of their habits and feeding is considered. Mice *thoroughly roasted* were prescribed by Dioscorides to be eaten as a medicine. They are not only used as food, but as a condiment for other food. Mouse sauce, and the preparation of it, have been described by M. Caille who was actually a willing partaker of it, at a village in Central Africa called Cacoron: it is common round the whole country. For the benefit of those who may be anxious about the proper mode of preparing this African delicacy, an extract shall be here given. M. René Caille says*, "As I had not yet breakfasted, I went to a Bambara woman, who was pounding boiled yams; I bought some from her for a few glass beads, and she gave me separately, in a small pot, some *gombo sauce.* On dipping my yams into this sauce, I discovered, to my great mortification, some little paws, and immediately ascertained that the sauce was made of mice, however I was hungry, and I continued my meal, though I must confess not without some feelings of disgust. In the evening, I saw many women chopping mice to make sauce for their suppers. I observed that they gut the animals, and without taking the trouble of skinning them, merely draw them across the fire to singe off the hair, thus prepared, they lay them in a corner of the hut, and it is not unusual to keep them there for seven or eight days before they are cooked." Perhaps the flavour of the sauce was rendered piquant to more senses than one by this delay.

According to Ælian, the mouse is possessed of the gift of foresight or prophecy; for when an old house is about to fall, the mice, he says, are sure to leave it! This absurdity is still a popular notion.

The *Leming* is eaten by the Laplanders, although it is said to be such bad food that even dogs and cats refuse it. They are larger than dormice, and are exceedingly destructive creatures, owing to their vast numbers, and their acting in concert.

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* Travels through Central Africa, i. 368

The *Marmot*, a winter sleeper, is generally well covered with fat, and sometimes weighs twenty pounds. Its flesh, however, has a rank smell, particularly in summer, which renders it disagreeable food; yet it is eaten by the inhabitants of the Alps, where these animals abound. It is, however, considered unwholesome. The Bobak marmot has a flavour of hare, but is rank.

The *Squirrel*, a lively, pretty, and cleanly little animal, affords a white, tender meat, which is much relished by some nations. It is much used in North America, and Hearne says that it is good eating there, although seldom fat. The Swedes and Norwegians also prize it. The Laplanders eat it; but they do not prefer it to the leming. It is said that squirrels, if obstructed by rivers during their migrations, will each commit itself to a piece of the bark of a tree, when the whole fleet set sail. During these voyages they are sometimes shipwrecked, and after this misfortune, the Laplanders make their harvest of them, eating their flesh and selling their skins.

Squirrels are common in the woods of England, and are eaten, not merely by the lower orders, but by many who consider their flesh a delicacy. In Ireland there are none of these animals.

The *Dormouse* (*dormiens mus*) is still, and always has been, considered a delicacy, even amongst civilised nations. We learn from Varro that the Romans had places called *Glivaria* for preserving dormice; and from Martial's epigram * we find that they were thought a great delicacy in the wild state. In the southern parts of Italy, where the dormice are abundant, they are smoked out of the nests which they build in trees, and are prized as a dainty. They are active, pretty, clean-feeding little animals, and seem intermediate between rats and squirrels.

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* Lib. iii. 58.

The *Jerboa*, or *Jerbuah*, is a small animal about the size of the common squirrel, and very like the kangaroo, having hind legs exceedingly long compared with its fore-paws. About Babylon, and in Arabia, they are abundant, are eaten by the inhabitants, and considered delicious.

The *Hare* was much esteemed as food by the Romans, as it is at present amongst most nations of the world who possess it. Alexander Severus was an unbounded admirer of it. Yet in Britain, where it is now such a favourite, it was in those distant ages prohibited, along with the goose and pullets, as unlawful food; such at least is the report of Julius Cæsar: yet they were bred for pleasure. The opinion of Galen on hares' flesh was, that it produces melancholy. Pliny, however, gives a very different account, for he says that a meal of it makes a person look fair and beautiful for a week afterwards; a notion probably about as well founded as Galen's. Pliny ridicules an idea of his ancestors, that a deaf hare will sooner fatten, when duly fed, than one that has his hearing. Yet the thing is possible; for, as the hare is not only one of the most timorous of all animals, but has perhaps more cause of fear than any other, its constant alarms may keep it more lean than one which, by being deaf, leads a life less disturbed.

In Peru, and at the Cape of Good Hope, the flesh of this animal is white like a rabbit's: in other places, it is of a very dark colour. Confinement, however good the feeding may at the same time be, always injures the flavour; and those inhabiting mountains are superior to those living in low grounds. In the London markets, hares are sometimes found which weigh so much as eleven or twelve pounds.

The flesh of the *polar* hare is whitish, and has a good flavour. The *varying* hare is insipid The flesh of the American hare is more brown, like that of the common hare; and Hearne says that in August they are good eating. The northern Indians eat the contents of its stomach. The full-grown hares, killed in Melville peninsula, weighed about seven pounds; and Captain Sabine states that the largest killed on Melville Island did not reach nine pounds. Hearne says that in his time they were killed near Churchill river weighing fourteen or fifteen pounds. The average of the American hares is about four pounds.*

Hares, as well as birds, are bewildered by light: on a late occasion, no less than seven were killed on the railway between Stockton and Darlington They were thought to be dazzled by the light of the fire of the steam engine, and thus entangled in the wheels. Several others were also destroyed, but were mutilated, and rendered unfit for the table.†

Hares are only fit to be sent to table when they are young. In order to judge of this, feel the first joint of the fore claw: if you find a small nut, the animal is still young. Should this nut have disappeared, turn the claw sideways, and if the joint cracks, that is a sign of its being still tender. (*Ude*) Or if the ears feel tender and pliable, and the claws smooth and sharp, the hare was young (*Dolby*) It is not fit for the table immediately after being killed: by being kept a few days the flesh becomes tender, but dark coloured, and rather unpleasant to the eye.

The *Rabbit* affords a meat more white and less savoury than that of the hare. It is still whiter and milder when fed in the tame state; and also becomes larger and fatter than when in a state of nature. They have been sometimes fed in coups to such a size as to weigh fifteen pounds, and, as some feeders affirm, twenty. The last mentioned weight was attained by a regular diet of cabbage leaves and oats, occasionally varied with barley meal. A doe, when suckling, will drink milk. Tame rabbits are best for the table at three months old; but, if well fed, will not be too old at eighteen months. Whether a wild rabbit is of the proper age for the table may be ascertained by breaking the jaw between the thumb and finger: if it is old, it resists the pressure. Or by feeling in the joint of the paw for a little nut: if it is gone, the rabbit is old. (*Ude.*) As to whether the tame or the wild rabbit is better meat opinions differ: I believe there is not much doubt that the former are more delicate and fat, although they have less firmness and flavour: M. Ude's opinion is that tame rabbits have no taste but that of cabbage. Tame rabbits may be always kept in a state fit for the table, but wild ones in good condition are procurable at particular seasons only. The wild rabbit is generally fatter than the wild hare, perhaps because it leads comparatively a tranquil life. Spain was once so overrun by rabbits, that ferrets, their natural enemies, were introduced from Africa to destroy them.

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* Parry's Second Voyage.

† Sunderland Herald.

Order VI. PECORA.

The *Camel* has been called "the ship of the desert," a designation which by no means expresses the extent of the services of an animal that in such a variety of ways conduces to the welfare of man. Patient and persevering, it bends its humble knee to receive the burden on its willing back which is to be transported over regions where its more aspiring competitor, the horse, dare not venture himself with any chance of surviving the journey. Ill fed and parched with thirst, it freely gives its pleasant and wholesome milk under circumstances that would render the cow useless. Its hair affords a comfortable clothing, and its flesh a wholesome sustenance. It is, in fine, the cow, sheep, and horse combined in one animal, to the Arabian.

The flesh of the camel is excellent meat, and is used by the Arabians, Tartars, and many other nations. There is a public market at Sennaar at which it is sold. In this last country it is the practice to eat the liver and some other parts raw.[c] The flesh of the young camel is said to be as delicate as veal. The dromedary also affords a meat that is much prized in the countries where it resides.

The *Lama.*—The graceful and gentle lama, the camel of the western hemisphere, is a beast of burden in South America, and is also much valued as food, its meat most resembling mutton. It inhabits the highest mountains. The Vicuna, a quadruped much resembling the lama, also affords a wholesome food, and is said to be a principal article of sustenance amongst the Patagonians.

The *Reindeer.*—In the northern parts of Europe, Asia, and America, the reindeer fulfils the duties of all our useful domestic animals. Strong, active, and willing, it flies with the sledge over the snows and frozen lakes, with the fleetness and perseverance of the horse. Contented with the scanty herbage of a frozen region, it nevertheless furnishes excellent milk and cheese; its flesh bears comparison with the best meats: its skin, sewed with its own sinews, affords clothing best suited for the severity of the climate. From its horns is made glue; and from its bones various domestic instruments. Its services are confined to those who most stand in need of them, for the reindeer will not live in the temperate regions of the globe, and it is found almost exclusively in those inhospitable climates which without it would be nearly uninhabitable, as Lapland, Spitzbergen, Kamtschatka, Siberia, and the whole of North America.

Dr. Richardson says that when the reindeer is in good condition, it is equal, if not superior, in flavour to the finest English venison.* Captain J. C. Ross declares that the meat of the reindeer killed in August has several inches thick of fat on the haunches, and is then equal to the finest English venison; but it is most tasteless, and insipid when in poor condition.

The length of this animal from the nose to the insertion of the tail is seventy inches; and its height at the fore shoulder is fifty-one inches. The contents of its stomach are considered a great delicacy by the inhabitants of the arctic regions, as has been already described fully.

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* Appendix to Parry's Second Voyage.

The *Moose* and the *Elk* are the largest of the deer tribe; they inhabit the forests of northern Europe and America, and until lately were considered the same animal.* They are both excellent venison. The carcase of a moose-deer often weighs upwards of half a ton: its flesh is nutritious, but more substantial than common venison; and it will bear salting. It is a gentle, peaceable, and easily tamed animal, and so timid, that in North America, as we are informed by Hearne, it is often killed by women or boys. He says the flesh is good, although the grain is coarser, and the fibre much more tough, than that of any other kind of venison. The nose is most excellent, but by no means so fat and delicate as that of the common deer. It is a remarkable fact that the livers are never sound. The moose is hunted by the Indians, but being over heated, its flesh is then soft and clammy, and far from being well tasted.† The weight of one of the North American elks, as determined by Mackenzie, was 250 pounds. The flesh of the elks of the Cape of Good Hope is compared by Kolben to good beef in flavour.

The *Stag*, or *Red-deer*, or *Hart*, is found in the temperate regions of Europe, Asia, and America, and thrives well where the reindeer will not live. The race is fast diminishing in Great Britain, although still found in parts of England, Ireland, and Scotland. It is strong and fleet, and of a noble and majestic mien. As venison, it ranks lower than the fallow-deer: the meat of the hind is preferable to that of the stag; and that of the fawn is superior to either. The stag has not arrived at perfection until it is four or five years old: it is best in August, and worst in the too succeeding months, on account of obvious causes. These animals are not always of so timid a character as has been attributed to them. There is at this moment one of them in the deer park of the marquis of Breadalbane which lately attacked a horse, struck his enormous antlers into his chest, severed the jugular vein, and killed him. This is the second horse killed by the same deer.

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* Swainson, Cabinet Cyclopædia.

† Journey.

The *Roebuck* has been long extinct in England, but is still found in the highlands of Scotland. It is also found generally throughout continental Europe and some parts of Asia. In Louisiana the roebuck was once very common, and was larger than those of Europe: its flesh has been compared in flavour to mutton.

The *Fallow-deer* abounds in almost all parts of Europe, except in the cold regions of the north, where its place is supplied by the reindeer. It is best in season in August, for after this it becomes lean and rank. Its flesh is the best venison of all the deer kind; and is in its prime at three years old, or, as some say, at four. It is much smaller than the stag. The Virginian fallow-deer is the same in size as the English, but its flesh is far inferior. It is peculiar to America; and the Indians dry it for winter provisions.

In general it may be observed that deer venison is wholesome food, but it disagrees with some. The colour of it when roasted is darker both outside and inside than that of butchers' meat. Its grain most resembles that of mutton; but its taste is different from that of every thing else, and in my opinion the peculiar flavour of the breast of a goose is slightly discoverable in it. It is certainly more sapid than any butchers' meat, and is even strong. Mr. Dolby says the choice of venison should be regulated by the appearance of the fat, which when the venison is young looks clear, thick, and close.

The *Antelopes* are a very numerous tribe of animals, varying in size from the dimensions of a small cat, nay of a rat, to the comparatively gigantic dimensions of the stag or elk. It would be in vain, in a work like the present, to attempt to give any sketch that could prove interesting of the numerous species of this animal. It will suffice to say that their flesh in general is esteemed excellent venison, and is eagerly sought. The royal antelope, little larger in the body than a rat, is one of the most delicately formed and beautiful creatures in existence. Its appearance is that of a stag in miniature. Such is its activity that it is capable of leaping ten or twelve times its own length. It abounds in Guinea, and its flesh is esteemed a great delicacy. They are never seen in this country, as they cannot bear the change of climate. The other extreme of size is found in the south of Africa, and sometimes weighs nearly half a ton.

The Boshmans, a tribe of Hottentots, the ugliest and most ferocious of all the savage races of the world, kill antelopes both by poisoning the waters where they drink, and by shooting at them with poisoned arrows. The flesh is, however, not affected by the poison, it is still good food, as is generally the case with other animals killed by these vegetable poisons. They use the precaution of cutting out the wounded part, when the poisoned arrow has been used.

The flesh of the antelope killed in the chase is more prized than that of the same animal when house-fed, that of some species has the flavour of common venison, and that of others partakes more of the taste of ox beef.

The *Nul-ghau*, a native of India, is an animal of the antelope kind, partaking also of the character of the ox and deer, its head and neck resembling one, and its legs the other. Its flesh is considered excellent food

The *Chamois* very much resembles a goat, and is much about the same size. It is one of the most timid, watchful, and keen-scented of all animals, and hence the hunting of them is a distinct and difficult art, it is also laborious and dangerous, and can only be followed by persons of robust constitution. The chamois is more generally killed with the rifle, and none but good marksmen need engage in the pursuit, as this wary animal will not permit himself to be approached to any short distance. Amongst the glaciers of the Alps, the hunter, clad in an outside white shirt, to render himself less distinguishable from the snow, cautiously creeps forward, hiding himself behind every projecting mass of ice, until within shot. He fires; perhaps the game falls; a shout of exultation announces his triumph; he seizes the carcase, embowels it, and as a preventive of giddiness, a dangerous contingency in these fearful spots, perhaps takes a draught of the warm blood. This is often a toilsome and dangerous pursuit, owing to the shyness of the chamois, and the precipitous nature of the place.

The flesh of the chamois is esteemed good food; when of a middle size, it weighs fifty or seventy pounds, and yields perhaps seven pounds, but sometimes so much as twelve, of fat, which is much harder and better than that of a common goat. The Swiss hunters cut the animal into pieces, and salt or smoke them. The skin is well-known under the name of chamois or shammy leather. It not unfrequently happens that the hunter, as well as the chamois, meets with his death, owing to the steepness and icy smoothness of the place, and the tumbling down of masses of rock. The huntsman, his father, and his grandfather have been known to have fallen successive victims to this most dangerous sport.

The *Domestic Goat* is not much prized for its meat in Britain; and although that of the kid is delicate and nutritious, it is not very sapid. In other parts of the world, goats' flesh is excellent food: in Dahomy, a kingdom of Africa, it is esteemed equal to mutton: the goats of the island of Fernandez were compared by Byron to the best English venison. Kolben says that the goats of the Cape are of a fine blue colour with blue beards, and are of the size of an European hart; their flesh is well-tasted, although seldom fat. They have also a goat speckled with white and brown, the flesh of which has the taste of venison.

No animal, making allowance for its small size, gives a greater abundance of milk than the goat, and in richness it bears comparison with any other.

Pliny says that goats' blood, if swallowed, makes people pale; and that Drusus, a Roman tribune, drank it when he intended to charge Q. Cæpio, his enemy, with giving him poison. It was affirmed by Archelaus, a Greek naturalist, that goats breathe through their ears instead of their nostrils. Such were the ancient wonders of this animal.

The *Sheep* is an animal of which little need be said: its vast importance to man, both for food and various comforts, has rendered the introduction of it into all parts of the world an object of persevering attention. There is scarcely a part of its body that is not turned to use: its flesh, wool, skin, blood, intestines, bones, hoofs, and horns, are all converted to the account of man.

The sheep is in its best condition, as food, when five years old—an age which it is almost never allowed to attain unless when intended for the private use of the owner, and not for market. It is then sapid, full-flavoured, and firm, without being tough; and the fat has become hard. At three years old, as commonly procured from the butcher, it is well-tasted, but is by no means comparable to that of five years.' If younger than three years it is deficient in flavour, and its flesh is pale. Meat which is half mutton and half lamb is very unpalatable food. M Ude says, "Always choose mutton of a dark colour, and marble-like."

It is the common practice in London to allow the hind quarter or leg to hang in winter for several weeks, or in summer as long as it can be kept without a taint, and by some persons even a day or two longer. The object of this is to render the meat tender. A disagreeable dark colour is thus occasioned; and such meat retains an appearance of rawness when it is only rare. Such meat answers for roasting; but if boiled it acquires an unpleasant brownish colour.

Wedder mutton is the best; but the mutton of the ewe that has never had a lamb is very good.

This animal in some parts of the world is distinguished by a remarkable peculiarity. Herodotus is the first writer that notices it: he says, "Arabia produces two kinds of sheep nowhere else to be found: one species have tails not less than three cubits long, which if suffered to trail on the ground would be so bruised as to ulcerate; but to remedy this inconvenience every shepherd is obliged to construct carriages upon which he binds the tail of the sheep: so every sheep's tail keeps its chariot. The other species of sheep have broad tails, even as much as a cubit wide." At the Cape of Good Hope the sheep of the present day have similar long tails, and the same expedient of a wheel carriage to support them and follow them is made use of. Such sheep are in fact common in various parts of Africa and Asia. Some of the Adel sheep have tails weighing twenty-five pounds; the tail of the Tartar sheep often weighs thirty pounds, and that of the Cape sheep sometimes fifty. This tail consists chiefly of a solid fat which in flavour Dr Shaw compares to marrow. it is esteemed a great delicacy, and is in fact the nicest part of the sheep; for Dr. Shaw says the flesh is inferior to that of the small-tailed sheep.

Domestic Ox.—Of this animal no description is necessary; its aspect, habits, manners, and the taste of its flesh are subjects of daily experience. In London alone no less than 360,000 of them, between oxen and calves, are annually consumed, or, perhaps more exactly, 1000 every day.

The flesh of the ox (*bos exsectus*) is more tender, sapid, and nutritious than that of the cow. It is commonly supposed to be in perfection at the age of four years. This may be true with regard to beef for present use; but if for salting, the truth is not so certain. The philosopher Boyle says, "Butchers in several countries observe that although a bullock under four or five years old be good to eat soon after it is killed, yet if salted and kept long, it will thereby be fretted and good for little."

The abominable practice of bull-baiting was once enjoined by law in order to make the flesh tender; for it is known to have this effect, in a slight degree. But this is an unnecessary cruelty, for the desired end can be attained more effectually by other means, not necessary to be further alluded to here. Bull beef is naturally coarse and tough: its use is at present chiefly confined to the making of sausages.

It was an opinion of the ancients, that bulls' blood is a poison. Pliny affirms this, and says that the physician Agathocles prescribed the juice of white sow-thistle as an antidote to it.* The antidote was no doubt infallible where the poison was imaginary. Herodotus says that Psammenitus king of Egypt was condemned by Cambyses king of Persia to be poisoned for inciting the Egyptians to revolt Bull's blood was the mortal draught selected; and Psammenitus, having swallowed his dose, immediately died. It is very probable that Cambyses added a little of something else to the blood, to make his work more certain

According to the same historian, the cow was worshipped by the Egyptians with more profound reverence than any other kind of cattle. It is still reverenced by the Hindoos, and to use its flesh, or even the water in which it is boiled, would be an abomination. A compendious method was adopted by Tippoo Saib of convincing these people of the errors of their religion, and persuading them of the truth of Mahometanism. He sprinkled them with cow-broth: they were forthwith shunned by their own sect, and had no alternative but to become subscribers to the Islam.

It appears to have been the custom in England, in the time of king John, to roast an ox whole, for an order of his majesty is extant commanding a furnace to be built capable of roasting two or three oxen. There can be little doubt of the superior flavour and juiciness of the nice parts, when the whole ox is roasted.

Veal, as every one knows, is whiter and more tender than beef; and, if well-fed, is as wholesome. It is a meat that does not keep well. If ill-fed, and its flesh in consequence of ill-feeding is red, it is apt to occasion sickness for some hours after it is eaten. The inhuman expedients resorted to for whitening the flesh of a calf, which it is anticipated would otherwise prove red, are, however, of no avail for improving its wholesomeness: much bleeding previously to death, will not compensate the want of abundant and wholesome food. The cow-calf is whiter veal: but the bull-calf, although redder, is better meat.

Observations have been made, in the beginning of this volume, on the mode of slaughtering oxen, and the object of the introduction of that process. It will be here sufficient to quote the remarks of Dr. Parsons on the humanity of the Jews, which is observed to the present hour, in slaughtering their cattle:—"I cannot avoid applauding the custom of the Jews, and from them the Mahometans, in one particular, which regards their manner of killing those animals their law allows them to eat: the person appointed for this purpose is obliged to prepare a knife of considerable length, which is made as sharp as the keenest razor, the utmost care being taken that the least notch or inequality may not remain upon the edge; with which he is obliged to cut the throat and blood-vessels at one stroke, whereby the painful manner of knocking them down, which often requires several cruel blows, and stabbing them in the neck with a blunt knife, are avoided. It was a law, founded upon true reason, that whatsoever beast was mangled in killing for food, should be accounted unclean. If there were no other meaning in it than to avoid, as much as possible, any kind of cruelty in giving them pain at their deaths, it is highly to be applauded by every humane breast."*

We read with horror the disgusting details of an Abyssinian feast, at which pieces of the quivering flesh, cut at intervals from the living ox, afford a meal of no ordinary relish to the human monsters that partake of it;

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* Parsons on the Analogy between Animals and Vegetables, &c 1752, p. 185.

while the mutilated animal is kept alive, in order that it may furnish future entertainment of the same kind. The narrative of Bruce, relative to this surpassing barbarity, may be a little exaggerated, but it is admitted that such a practice exists at least on a small scale.

The *shulada* is the cutting away of two pieces of flesh near the tail of the ox, the lips of the wound being drawn together by sewing, or *by a skewer*, and the wound covered with clay. The pieces of reeking beef, without undergoing any ceremony of cookery, are instantly devoured. Indeed the details of Bruce are so circumstantial that it is hard to withhold one's belief of its being substantially true.

Mr Grose * says, that at the island of Johanna a kind of oxen abound which have a fleshy excrescence between the neck and breast: this tastes like firm marrow, and is generally preferred either to the tongue or udder.

The *Buffalo* is a native of Asia and Africa, where these animals are so large as often to weigh 1000 pounds. A smaller race is domesticated in Italy, originally introduced from India by king Agilulf. Buffalo beef is tough, dark coloured, and occasionally musky. In some countries, however, it is of a better quality, but never is equal to ox beef. Buffalo veal is said to be but middling food. In Italy, buffalo flesh is chiefly used by the common people; but the chine is esteemed by all classes. This animal gives excellent milk, the butter made from which, if clarified, will keep a long time. It is largely consumed in India, and is there called *ghee*. Cheese is also obtained from the milk. The buffalo has been domesticated for the purposes of labour.

The *Bison*, improperly called the American buffalo, is peculiar to North America, and formerly inhabited immense regions of that country. These fine animals are now fast disappearing, such has been the exterminating slaughter with which their tracks have been pursued; sometimes for the sake of their flesh, hump, tongue, or skins; sometimes for no other reason than wanton cruelty. As many as ten or twelve thousand tongues have been brought to market in a single boat.* Within two years, 700 bisons were killed by the early settlers merely for their skins, which were sold for two shillings each, and the carcases were left a prey to wild beasts. They are now only found in the unsettled regions of the north and west, and in these parts thousands of them still exist. Many tribes of Indians subsist upon their flesh, almost exclusively; hence they become less numerous every year.†

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* Voyage to the East Indies.

The bison was until lately supposed to be a variety of the domestic ox; but it is now known to be a distinct animal, in some respects similar, but differing in others. One of the most striking differences is, that the bison has a rib on each side more than the ox, and that the former is a fierce-looking animal, with an immense quantity of hair round the throat and on the shoulders, on which latter part is a remarkable hump, in some degree concealed by the hair.

When four years old, the flesh of this animal is considered by some to be preferable to ox beef, in point of flavour and tenderness, although the fibre is coarser. The flesh of the bull bison is poor and ill-tasted during August and September: that of the cow is always preferable, being more tender. Mr. Hearne says that bison beef is so light and easy of digestion that it is not deemed substantial food by any of the Indians north or south of Hudson's Bay. He says it is good eating, without any disagreeable taste or smell, and resembles ox beef as nearly as possible. The hump consists of equal fat and lean intermixed, and is amongst the nicest bits. He says the tongue, always delicate, is more so when the beast is in poor condition, but thinks it inferior to an English ox tongue. The cow, when some time in calf, gives the best meat. The immature calf is deemed a great delicacy.‡

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* American Journal † American Encyclopædia.

‡ Hearne' Journey, pp 254 264.

By other persons the hump is represented to consist of a kind of fat which, when properly cooked, resembles marrow in flavour. Dr. Goldsmith was assured that it cuts and tastes somewhat like a dressed udder. The Indians bake it in a hole in the ground, previously heated by a fire; it is covered with earth, and a fire is kept burning over it for many hours. The weight of the hump is often fifty pounds.

The skin of the bison, with the fur on it, is used as a warm covering; and the softest part of the fur is used for making hats, and also a coarse cloth.

The *Gnou* is a singular kind of ox; having a very large head of the ox shape, a body and tail like a horse, and legs like a stag. Some have classed it as an antelope. It is an inhabitant of Africa. Its flesh has no flavour of beef, but rather that of the antelope tribe: it is juicy and delicate.

The *Musk-ox* is an uncouth-looking animal covered with an enormous quantity of soft hair or wool, and having a large fierce-looking head and thick horns. The body is supported on short legs, scarcely appearing amidst the profusion of hair, which almost trails on the ground. It is an inhabitant of North America.

The musk-ox has a musky disagreeable smell, which is still more strong when the animal is lean. When in bad condition it not only has this smell, but the flesh is very dark and tough. If fat, its flesh is well tasted, and is then preferred by the copper Indians to the rein-deer. (*Richardson.*) The bulls yield about 400 pounds of flesh, and the skin and fur are much valued for their warmth. Capt. J. C. Ross * says that they found the meat of the musk-ox most excellent food, and quite free from any musky flavour, although the skin smells strongly of it. Hearne and his companions found this meat not only coarse and tough, but smelling and tasting so strongly of musk as to make it very disagreeable when raw, although tolerable eating when properly cooked.* The contents of the stomach are eaten by the copper Indians.

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* Appendix to Second Voyage of Capt Sir J Ross.

Order VII. BELLUÆ.

The *Horse* is used in some countries for almost all the purposes that the camel is applied to, as a beast of burden and as food: its hair is manufactured into a kind of cloth; other parts into various articles, and the milk of the mare is much prized as such, and as a means of producing an ardent spirit.

Amongst the refined inhabitants of Europe, the repugnance to horse-flesh as food is, in times of abundance, considerable; but when hunger pinches is easily overcome. During the late siege of Bilboa, horse-flesh sold so high as 2*s.* 2*d.* per pound. During the French campaign in Russia, horse-flesh was a banquet; and much more revolting food was not rejected. General de Ségur, in his history of this unfortunate expedition, informs us that a Russian soldier took up his abode in the carcase of a horse that had been embowelled by a cannon-ball, and lived there for several days, during which he devoured all those parts that were within his reach.

There is an extraordinary establishment at Montfauçon, near Paris, where the carcases of horses are converted to various uses. The hair is woven into a coarse cloth, as cow-hair is with us; the skin is sold to tanners; the hoofs are sold to turners, comb-makers, and makers of sal ammoniac and Prussian blue; the fat is sold for burning in the lamps of glass toy makers, for soap-making, and other purposes, the tendons are sold to glue-makers. The bones are useful for making ivory-black, sal ammoniac, handles, and various utensils, the intestines are twisted into strings for lathes, &c. Such animal matter as cannot be otherwise employed, is stratified and covered with straw: in this state it putrefies, myriads of maggots make their appearrance, and these are sold by measure for fattening poultry.

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* Journey, p 31.

But the most extraordinary feature of this conversion of horse carcases is that the workmen employed in it actually are fed upon the flesh. In the *Bulletin Universel* it is stated that portions of horse-flesh, of the finest quality, are fraudulently substituted for butcher's meat in the eating-houses of the lower orders at Paris. This is not considered as any great hardship, as the experience of the French armies has proved that the flesh of a well-fed and healthy horse is wholesome diet: but the wretched worn-out creatures condemned to be slaughtered cannot surely be considered in this point of view. Mr. Ross Cox informs us, in the history of his adventures on the Columbia River, that the flesh of a horse which is tame, well-fed, and occasionally worked, is tender and firm, and the fat hard and white; and that it is far superior to the wild horse, the flesh of which is loose and stringy, and the fat yellow and oily He says they generally killed the former for their own table; and assures his reader, that if he sits down to a fat rib, or a rump-steak, off a well-fed four year old horse, without knowing the animal, he will imagine himself regaling on a piece of prime ox-beef. Foals or colts, he says, are not good food: a horse for the table should not be under three years old, nor above seven.

After such evidences, we must no longer feel surprised at the practice of the ancients and moderns, whatever disgust the idea may at first excite. The Tartars are much addicted to horse-eating; and, as we learn from Martial, were equally so in his day. Some of the Tartar tribes, when their horses are past their labour, send them to the woods to fatten, and when plump kill them. Herodotus gives the following account of the habits of the ancient Persians. He says they pay particular regard to their birthday, and produce on it an ox, a horse, a camel, or an ass cooked whole in a furnace. Strabo assures us that the Sarmatians lived on milk mixed with horse-blood; yet Pliny affirms that this latter delicacy is corrosive and dangerous. In the present day, if we are to believe common report, the English lover of delicacies, when he sits down to his Russian reindeer tongue, innocently enough partakes of what he could obtain from a source much nearer home. In parts of Chili, the natives prefer horse-flesh to beef and mutton, and accordingly chiefly subsist on it.

Mr. Miers, in his "Travels in Chili and La Plata," vol. i. 260., gives us the following details of a detestable banquet amongst the Pampa Indians between Buenos Ayres and Mendoza: — "A number of mares and a quantity of aguardiente (ardent spirit) was given to them, when they all set to with earnest intent upon the feast. The mares were killed, the blood being carefully preserved: the Indians arranged themselves in small circles, and squatted on the ground, the women acting as attendants upon the occasion: they fell to eating the raw horse-flesh with great voracity, seeming to relish with peculiar delight the viscera; partaking at intervals, in copious draughts of their favourite beverage horse's blood mixed with gin. They continued singing loud boisterous songs.—It was not long before all were drunk; when the riot became more boisterous, and continued great part of the night.—Next day, the men being sober, it fell to the lot of the women in their turn to enjoy their entertainment: they were now waited on by the men, served with the same food, and regaled with the same horrible beverage, until they, like the men, got completely drunk; and like them became noisy, turbulent, quarrelsome, and brutal in every possible way."

The Kalmuc and Nagaian Tartars give a decided preference to horse-flesh, and seem always to have done so, as we find them named *Hippophagi* by Pliny. They are by no means particular as to whether the horse was slaughtered or died a natural death; or whether the flesh is raw or cooked. They tear the flesh from the bones with their fingers, and devour it eagerly. Their koumiss, or fermented mares' milk, has been described in the first volume of this work. They also use the unfermented milk as food, and prefer it to that of the cow: there can be no doubt that it is a wholesome and excellent article of diet. Hippocrates gives an account of the Hippomolgi, a nation of Scythia, who made it a chief source of subsistence. In parts of Siberia, horse-flesh is eaten at funeral ceremonies. In Caffraria and Angola, it is used as food whenever procurable: even the Chinese do not disdain it. The Arabs eat the flesh of the wild horse of the deserts of Africa. Horse-flesh is a principal article of food amongst the athletic Patagonians—raw or boiled, according to fancy or convenience: they also delight in a marrow-bone from a horse.

The *Ass*, as treated and fed in this country, does not afford a meat that holds out much temptation. It is said to be inferior in every respect, even to horse-flesh. Yet the wild ass, especially that of Africa, was a highly prized delicacy amongst the Romans; and its sucking-foal is eulogised by Martial. We have it on the authority of Varro, that Q. Axius, a senator, gave 400,000 sesterces for a male ass for breeding. But according to Pliny, the celebrated Mecænas was the first that brought the flesh of ass foals to table, and preferred it to the venison of the wild ass. After his time, however, it fell into disrepute. The opinion of Galen was, that it is an unwholesome meat. The Romans sacrificed the ass to Priapus: and the Roman ladies, arrived at a certain age, found great virtue in asses' milk as a preventive of wrinkles. Such a horror had some declining beauties of the ravages of time, that, as Pliny assures us, some of them kept 500 asses each, for her own use, in imitation of the empress Poppæa, the wife of Nero, who actually bathed in asses' milk,—a piece of voluptuous extravagance, not to be wondered at in a lady who kept her horses shod with gold.

The *Wild Ass*, or *Onager* of the ancients, affords a meat, that in some countries is highly valued. The Persians hold it, as the Romans did formerly, in the greatest esteem; and we have strange accounts of the banquets given by their monarchs, where there was a most prodigal profusion of this favourite food. Amongst the people of that nation, the wild ass always held a high place in public estimation: it was not only an object of the chase, but was used in battle. When the army of Xerxes advanced towards Abydos, the Indian cavalry had war-chariots drawn by them: and Herodotus says, that during the expedition of Darius against the Scythians, the braying of the Persian asses so terrified the Scythian horses, who had never before heard such abominable discord, that in some degree the fortune of the war was affected by this circumstance. In the deserts of Libya and Numidia, the wild ass is hunted for its flesh; and from Pliny we learn that it was always in request in Africa as food. The Arabians are also very fond of it.

The *Dshikketaei*, or *Wild Mule*, inhabits the southern parts of Siberia, and the deserts of Western Tartary. It is a timid animal, yet indocile and intractable. The Mongolians and Tungusians make use of them as food, and prefer them to horses.

The *Zebra*, an animal of a form as beautiful as its disposition is intractable, is somewhat larger than an ass; its body is elegantly striped with black; its legs are white; its general colour is cream-white. It is a graceful, light, and active creature. It abounds in Africa: the Hottentots, the natives of Congo, and Loango, and other nations, consider its flesh excellent food. Lieutenant Paterson, who partook of it in the country of the Hottentots, speaks in praise of it.

The *Hippopotamus* is a huge, unwieldy creature, living for the most part under water, at the bottom of large rivers and lakes, where it roams about at its ease; occasionally raising its nostrils above the surface to take in air, or coming on land to feed on herbs and grains, for on such it entirely subsists. It sometimes measures fifteen feet or more. The skin is exceedingly hard and thick, and is in some parts impenetrable to a musket-ball; but it is less dense over the belly: it is very thinly or scarcely covered with hair, and its colour is brownish. It weighs between two and three tons, and often one third of its weight is fat. Notwithstanding the savageness of its aspect, it is by no means a ferocious animal, unless in its own defence. On land, owing to its clumsiness and obesity, and the shortness of its legs, it is inactive and timid, and can badly insure its safety by flight; but its great strength, and the monstrous calibre of its jaws, render it a frightful and dangerous enemy. It was sacred in some districts of Egypt, but not in all. The Africans kill this animal with a kind of harpoon, much in the same way that whales are captured.

The flesh of the hippopotamus affords a welcome and substantial meal to the African; and he is not solicitous as to whether it is a young or old animal, although the latter, owing to its obesity, is strong and unpleasant. It is said to taste like ox-beef, but much inferior: the roasted tail and dried tongue are the prime delicacies. The young hippopotamus affords excellent meat; the breast has been compared to delicate veal. This huge and hideous animal has been for a long time gradually disappearing; and, perhaps, before many centuries have elapsed, will be only known by its fossil remains. Its hide is manufactured into whips by the Africans: one hide will sometimes afford 500.

The *Tapir* is an animal partly resembling an elephant in shape, and partly a hog; some have compared it to a rhinoceros, and have even seen a likeness to the hippopotamus. It is about six feet in length; is but poorly provided with hair: over its mouth hangs a short proboscis; but it is almost destitute of a tail. It is a clumsy quadruped, yet not without some activity. Its disposition is not ferocious. It is an expert swimmer, and addicts itself much to the water. The American Indians make much use of its flesh as food. Some have praised it as equal to beef; others represent it as much inferior.

The *Hog* [illegible] decidedly one of the most useful animals that is employed in the sustenance of man, on account of the qualities of its meat, the nature of the food on which it can subsist, and the comparatively small trouble which it occasions.

Some breeds are highly valuable compared with others, with regard to facility of feeding, and the quantity of meat which they will return; some will fatten where others would remain starvelings. The Berkshire breed is one of those most approved of: the old Irish breeds are hard to be fed, particularly those with long legs, and ears hanging much over their eyes; one of these will consume as much food as would fatten two of the Berkshire breed.*

In Ireland, pork is the cheapest of all meats; in England it is one of the dearest, owing to the better quality of feeding, and the care taken of the pig. In China it is more prized than any other meat; and is considered much superior to English pork, as is also that of the kingdom of Siam, from which country the Chinese hog is derived. The animal is cleanly in its habits, and is reared in the houses rather as a pet. The *babirouessa*, or Indian hog, is considered the best meat throughout Hindoostan: its form departs considerably from that of the common hog; and it has enormous tusks, which have obtained for it the name of the horned hog. It is said that, in a state of nature, the animal sleeps suspended by these tusks from the branch of a tree. The wild babirouessa is hunted like the wild boar, and is then very fierce. The chief defect of its meat is that it does not keep well.

The wild boar, a powerful and ferocious creature, from which the domestic hog is believed to have originated, affords excellent meat: it is a favourite with all nations, civilised and savage; and is as much sought after by the islanders of Owhyhee as by the nobility of Europe, whose dangerous sport it still is to hunt and spear this animal. Boar-hunting was once practised in Great Britain. When the wild boar has been hunted down and killed, certain parts are generally removed, as otherwise the flesh would become too rank for eating. William the Conqueror punished any person guilty of killing this animal in his forests with the loss of his eyes.

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* Lambert on Rural Affairs of Ireland.

The wild boar was a favourite dish amongst the Romans, as appears by the peculiar allusions of their satirists to it. Pliny reprobates P. Servilius Rullus as the first Roman that served up a whole boar to table; but afterwards he says two or three boars were served at a time and consumed. The mode of cookery employed is thus laid down by Apicius:—Aper ita conditur. Spongiatur, et sic aspergitur ei sal, cuminum tritum; et sic manet. Alia die mittitur in furnum: cum coctus fuerit, perfunditur piper tritum. Condimentum aprinum: mel, liquamen (a liquor made from the intestines of fish) caræenum (wine boiled to one third) et passum. Every one will judge for himself how he would relish honey and boiled wine with his salted and peppered wild pork. Martial complains of the expense he was put to by a present of a wild boar,—

> But then the cook demands such store of spice,
> Choice wines for pickle, of the highest price

The quality of pork is greatly influenced by the treatment of the pig. Tranquillity of mind is said to be essential to its being a thriving animal. One of the chief particulars to be attended to is cleanliness both in habits and feeding. Pigs are not so filthily inclined through preference as they often get credit for: on the contrary, they are never in prime condition when they are allowed to wallow, and to feed on foul garbage. Beside being cleanly food, it must be nutritive and peculiar. The animal, while very young, need not be so particularly fed; but when preparing for the market it is customary to pay greater attention. Dried peas and beans, grain-meal, and milk are used to *harden* the fat, and without some such means the fat is soft and less wholesome. Round the forests of England it is the custom to drive the pigs in at the proper season, that they may feed on acorns and various kernels which fall from the trees. The Westphalia hams owe much of their excellence to a similar practice, and perhaps to a cross of the wild boar in the breed of hogs, kept up at intervals. The following is, according to sir A. B. Faulkner, the method of treating the animal:—The pig is turned out into an oak forest as soon as he is weaned, where he fares, like the wild boar, upon acorns and long earth-worms. The ham made from this is subjected to the cold smoke of wood and dried leaves, and finally undergoes a slight powdering of saltpetre to give it colour. The astringent power of the acorn may well be supposed to harden the flesh, and perhaps to communicate flavour, as the feeding often does. The celebrated Mr. Boyle says he was assured, by a person conversant in this matter, that the flesh of pigs fed on shellfish contracted a fishy taste: this opinion is still a prevalent one.

Young and well-fed pork is highly nutritious, sapid, and digestible. Ill-fed pork often disagrees and produces nausea, eructations, catharsis, and tormina; as, indeed, the best will upon some peculiar constitutions. Of all meat it is best calculated for long keeping, on three chief accounts;—because with a small quantity of salt it keeps better than any other; because it acquires saltness more slowly than any other; and because, with the same degree of saltness, it remains more succulent and sapid. Hence its use on long voyages. Perhaps the following singular fact has some connection with this facility of preservation:—During the excavation of a pond in Devonshire, the workmen met, at the depth of ten feet from the surface, a spongy substance with pieces of bone, fat, and skin, all of a brown colour. On pursuing the discovery, they extricated the bodies of several hogs, in colour and substance resembling Egyptian mummies: on some the flesh was six inches thick, and the hair was still on it. Circumstances proved that the hogs must have been entombed there at least three centuries before, and how much longer there was no evidence to prove.

Pork that has been ill-fed, or is old, and upon these accounts is less wholesome, is much improved by being kept long in salt. With persons of a sedentary habit, pork is much more likely to disagree than with those whose occupations are laborious. It was the opinion of the ancients, and is by no means relinquished at present, that in a given weight there is a greater quantity of condensed nutriment than in any other meat: and corresponding with this opinion, we know that a less quantity of it is generally made use of at a meal.

The flesh of the sucking-pig, when it does not exceed eight pounds in weight, and the body is round and plump, is wholesome and delicate food: to most people even its fat is easily digestible; but there are many with whom it disagrees.

The Romans were disgusting epicures in swine-flesh. The vulva or matrix was a favourite part, and of the condition of the animal from which the organ was taken there was much difference of opinion. Martial says—

Te fortasse magis capiet de virgine porca,
Me materna gravi de sue vulva capit

The condiment prescribed by Apicius for *vulvæ steriles*, which seem to have been his choice, is composed of "laser cyrenaicum vel Parthicum cum aceto et liquamine temperatum." This latter was some fetid exudation of an herb resembling assafœtida, and liquamen was a putrid sanies from fish. Pliny gives us some other subdivisions of this kind of dainty: he says that the vulva from which the immature fœtus has been expelled is more prized by gluttons than that which went through the natural stages. The best vulva is that of a young animal after a first litter; or of an old one that has ceased.

The sumen porcinum, *i. e.* abdomen cum subere, was also a favourite. Pliny praises that of one which has recently acquired a family: and Apicius has expended some of his delectable skill on its cookery. The Roman censors published edicts prohibiting the use of these delicacies at suppers. Yet Publius, an obscene poet, had his sumen every night, to which he gave the name of *summa*, expressive of his utmost admiration.

The hog is generally accounted the most stupid and indocile of all animals, a sordid sensualist, and a foul wallower in every sort of filth. That his time is chiefly occupied in eating and sleeping, is true; but we ought not to find fault with him on this account, as it is thus that he accumulates so much excellent meat upon a small skeleton. While he is asleep, he is tranquil in mind; and without being made comfortable he will not thrive. That he is unclean in his feeding is true; for nothing comes amiss to him, even the half-putrid carcases of animals,—nay, that of man himself. but it has not been proved whether this is from choice or necessity, and the probabilities lie on the latter side. That he is stupid and intractable is certainly untrue, when proper methods are resorted to; as is proved by the extraordinary feats of the *learned pig* exhibited in the metropolitan cities of Great Britain, and still in the recollection of persons living. Nay, there are testimonies in support of their being musically disposed animals, and capable of distinguishing musical sounds. Polybius says that, in Italy, those who had the care of swine never inclosed them in separate pastures, nor followed them as was the practice of the Greeks; but went before them, occasionally sounding a horn. The swine always assembled at the sound, and were capable of distinguishing their own proper horn; and their exactness in this respect, he says, was almost incredible to those who had never heard of it before. When different herds mixed, the conductors went to different sides, and sounded; on which the herds separated, and ran with such alacrity to the sound of their respective horns, that no violence could arrest their career. This practice is, no doubt, the origin of the horn used by spayers, and blown by them on entering a town as a kind of proclamation of the nature of their office, and to invite the porcine race.

The *Peccary.*—Amongst hogs may be classed the *peccary*, or Mexican hog, which having a general resemblance to the domestic hog, is very dissimilar in other respects. It has no tail. On its back is a protuberance which contains a strong-smelling liquor. It can be easily domesticated: it chiefly feeds on vegetables, but it eats serpents also. It is used as food, but is inferior to common pork.

Order VIII. Cete.

The *Narwhal* is valuable for its oil and ivory; it is used as food by the inhabitants of the arctic regions. The Greenlanders eat its flesh, intestines, and skin.

The *Whale*, the great leviathan of the deep, the largest of animals, contributes his gigantic body to uses various as important. This enormous creature, the Greenland whale, is fifty and sometimes sixty feet long, and its circumference more than half as much. Of its whole length the head occupies about one half; and its mouth is capable of containing a merchant ship's jolly-boat. Its tail is twenty feet broad. Its shape is singularly ugly; except in the tail, it has little resemblance to a fish, and none to any other animal. Its eye is not larger than that of an ox, and is ridiculously contrasted with the vast dimensions of its head.

Notwithstanding the magnitude of the whale, it is but badly prepared with the means of attack or defence. Conscious of these deficiencies, it is by no means courageous; it is even timid, and yields to the destructive powers of much smaller animals. Of the vast importance of the whale fishery no notice need here be taken: it is much to be lamented that there is some prospect of its ultimate failure: at least, this is the opinion of some good judges.

The flesh of the whale is eaten by the inhabitants of the Arctic regions. There are parts of it which are no contemptible food even to those who are not pressed by hunger; about the tail is the portion preferred. Amongst the Greenlanders, the heart and tongue are the chief delicacies: of the size of the tongue, some idea may be formed by its having been compared to a feather-bed; and of the heart, from the fact of its propelling fifteen gallons of blood at each stroke.

Several species are used as food. The Greenland and Spermaceti whales are very generally consumed: the piked whale and fin-fish are also much used by the Greenlanders: the latter is compared to sturgeon, and the fins and swimming paws are the parts chiefly prized. The Caing whale affords an important source of profitable employment on the coasts of Shetland, Orkney, and Iceland. These animals appear in shoals, and when taken are salted in large quantity. The flesh is much esteemed, its taste in some degree resembling that of beef. They are also taken at the Faroe Islands in vast abundance. The flesh is dried in buildings where there is free access of air, and is considered excellent food, although having a very bad smell.

The Greenland whale is useful for many purposes: the flesh for food; the blubber for affording the best of all lamp-oils; the bone, as it is called, for stays and umbrellas, as well as for rafters for arctic houses; the split sinews for thread; the dried intestines for windows, instead of glass.

The whales have deserted the east side of Baffin's Bay, as they did Spitzbergen. They continue to retire from the persecutions of man; and the annual destruction of the young by the avaricious fishermen must soon exhaust this fishery; and search must then be made far to the westward of Baffin's Bay.*

The *Porpus* resembles the dolphin, but is not so slender: they are voracious creatures, and hunt their prey in packs like dogs: they were once a favourite at the tables of the great, and king Henry VIII. gave occasion for some witticisms by his fondness for this archetype of obesity: if it was too large for a *horse-load*, an extra allowance was made to the purveyor.* The sauce used was composed of vinegar, bread-crumb, and sugar. In some countries it is still used. The flesh of the young animal has been compared to veal, and is said to be well-tasted. In Norway, a delicate caviare has been made from its eggs. Occasionally a porpus is brought to Billingsgate market; but instead of being food for kings, not even the beggar will touch it: it is bought only for show by the fishmongers.

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* Ross, Second Voyage, App. xxiv.

The *Dolphin*, the theme of poets and painters, great and small, in all ages, the subject of many a beautiful fiction and absurd romance, whose graceful curves and sportive bounds have been reported with all the charms of exaggeration; — of whose iridescent body the beautiful and varying tints have been described with an abundance of imagination equalled only by the deficiency of truth, — has dwindled in the accounts of modern naturalists into a slender fish-shaped animal, about nine feet long, with a large head, wide mouth, long snout, of a black colour on the back, and white underneath; voracious in habits, and fierce in disposition.

This fish has been represented as fond of the society of man: it certainly is often known to accompany ships on long voyages, sometimes following in her wake, sometimes sporting at her prow, or springing its whole length in the air. Whether this indicates a love of human society at an humble distance, or a hope of nearer acquaintance, similar to that which influences the attentions of the shark, is doubtful. Certain it is that in a storm it becomes more frolicsome than ever; and the greater the danger, the greater is its exultation.

The flesh of the dolphin was formerly esteemed a delicacy. We read of an English feast consisting of a roasted dolphin with porpus sauce. Yet, except about the shoulders, the flesh of this animal is said to be rather tasteless. The young dolphin is reported to be far superior to the old.

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* MS in British Museum.

The *Beluga* is of the dolphin tribe. It inhabits the northern seas and great rivers. It varies much in size according to the place in which it is captured. In the river Don, it scarcely exceeds twelve feet long; but in the country of the Cossacs it is found four or five times that length. In the Caspian Sea, a beluga was taken which weighed much above a ton. The roe of those taken in the Volga is made into caviare. It is the largest of all the eatable fishes. Some have compared the flavour of this fish to that of beef; but it is rank and oily.

SECTION II.

Class II. AVES.

We now come to the BIRDS, or second grand division of animals. Of these, so great a variety contribute to the sustenance of man, that it would be a vain attempt to give even the shortest account of their habitudes within the compass that can be allotted to them in this volume. This is, perhaps, the less to be regretted, as the history of many birds is not correctly known; and as, compared with quadrupeds, their structure is less complicated, their habits less interesting, and their intelligence inferior. The enumeration here given shall therefore be confined to those birds more generally known as food, and the facts given in the shortest possible compass.

Order I. ACCIPITRES.

The flesh of birds of prey, as might be supposed, is coarse, strong, and disgusting: it is lean and fibrous, and soon runs into putrefaction. Yet not only has it been eaten by persons pinched by necessity, but has even found its admirers. The vulture, a foul bird, which feeds on putrid carrion, and smells of it, is said by Bellonius to have been prized by some, and dressed for eating. It is in vain that, when killed, the hinder extremity has been cut off; in vain that the body has been washed and spiced to overpower its prevailing odour; it still tastes and smells of the carrion on which it feeds, and of which the putrefaction only serves to allure them. Bellonius further says that the osprey, a species of eagle, is, when young, an excellent bird as food. According to Mr. Moore, the bald eagle is eaten by the Mundingoes.* The flesh of the American condor, a gigantic bird, has been tried, but found to be complete carrion. The horned owl is sometimes eaten in Italy, notwithstanding its smell. The honey-buzzard, aided by acid condiments, is prized by some, when young and in good condition. The sparrow hawk, when young, is not without its admirers. But there is no use in further particulars of a kind of food disliked by almost all mankind.

Order II. Picæ.

The *Parrot,* while young, is delicate food, but by age becomes coarse and dry. Its flesh is very much affected by the food on which the bird lives, and acquires a peculiar taste from it. As meat, the paroquet is much superior; especially that of Brazil.

The *Toucan,* a South American bird, is by some represented as delicate eating; by others it is described as coarse and tough.

The *Rook* affords a dry and coarse meat. A pie made of young rooks is tolerable; at least, it is the best form for using these birds as food. There is, in the opinion of some, a resemblance between the flavour of the young rook and that of the young pigeon.

The *Jay* is an amusingly imitative bird, ready to catch the tones of other birds, or even of the human voice. It may be taught to chatter certain words; and having once acquired this accomplishment, it becomes exceedingly loquacious and noisy. From this quality, a very in-elegant etymology has been given by Whiter: he thinks that the name jay is derived from *jaw*, a low word signifying brawling talk. The notion is somewhat supported by the Latin name of this bird, *graculus*, which, Isidore thinks is derived from *garrulitas*.

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* Travels in Africa.

The jay as food is scarcely superior to the rook, unless in its best condition, and then it is tolerable. Some are of opinion that when young it has the flavour of goose, provided it has been partly boiled, and afterwards sufficiently roasted.

The *Crow* is scarcely eaten in any part of the world, so tough and unsavoury is its flesh. It is a bird of filthy habits, it lives on carrion, no matter how putrid, and on almost any thing that comes in its way. To be obliged to subsist on crow's flesh was made a part of the punishment of robbers by Actisanes a king of Ethiopia.*

The *Roller* is valued as food by the inhabitants of some countries, and its taste is supposed to bear some resemblance to that of turtle.

The *Cuckow* is remarkable amongst birds for the sagacity and dexterity with which it manages the rearing of its young by deputy. According to Dr. Jenner †, who studied the habits of this bird, it arrives in England about the middle of April and leaves it the first week of July, thus remaining a period of time too short for building a nest, for laying eggs, hatching them, and rearing the young The cuckow therefore drops her eggs into the ready-made nests of the hedge-sparrow, the waterwagtail the titlark, the yellow-hammer, the green-linnet, or the whinchat. Of all these she prefers the nest of the hedge-sparrow, because the young cuckow when hatched can push out the young sparrows or any eggs that the nest may contain, and thus become the heir of both the nest and the attentions of the parent birds. The hedge-sparrow unconscious or careless of the substitution per-forms the office of nurse, while the old cuckow having accomplished the object of her visit takes her departure to other countries. It is a curious fact, that although the full-grown cuckow is five times the size of the hedge-sparrow, her egg is very little larger; and hence is not readily discoverable in a nest containing several other eggs.

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* Diodorus Siculus I.

† Philosophical Transactions, 1788.

The cuckow was one of the dainties of antiquity. Pliny tells us that there is not a bird to be compared with it for excellence of flavour. In England it is scarcely used as food, but on the Continent it is not uncommon. Amongst the Arabs it is esteemed a great delicacy.

Order III. Anseres.

The *Swan* was once esteemed a prime delicacy. But as this bird lives 100 years (*Cuvier*), reference must have been made to its age. By an act passed in the reign of Edward IV. none except the son of a king was permitted to keep a swan, unless possessed of five marks a year; and taking their eggs was punished by a fine and one year's imprisonment. In the present day this majestic bird is kept for its beauty only, its flesh being black and hard; but cygnets in good condition are known as a great delicacy. The latter weigh about twenty-five pounds, and sell for one guinea. The taste somewhat resembles that of a pigeon. The wild swan's flesh has been compared to goose, but is inferior.

In the fur countries the wild swan soon after its arrival there becomes fat and is then much prized as an article of food. (*Richardson.*)

The *Goose*, as an article of food in Britain, needs no observation; every one can make up his mind from his own experience as to its wholesomeness, taste, and other qualities. But it is not universally a favourite. The following is extracted from the Morning Herald September 29. 1835:—"In France the goose is in little repute as a dish, and seldom appears on the tables of

Parisian epicures. The flesh they consider as coarse and unwholesome; and the apple-sauce, when mentioned, never fails to elicit flashes of astonishment, subsiding into peals of laughter. But the liver and thighs of geese, learnedly made into pies, and properly truffled, '*pâtes de foies gras,*' are reckoned a most delicate article. The department of Perigord, with Toulouse, and Bayonne, used to cook annually about 120,000 of these pies. Large droves of geese were anciently led from Picardy to Italy, waddling over the Alps, and constantly stooping, according to their prudent custom, under the triumphal arches which they happened to pass in their way."

It was a part of the duty of the censors of Rome to take care that the geese of the capitol were well provided with food: for that sagacious animal once saved the capitol when the dogs neglected their duty, on which account, says Pliny, the dogs were annually hanged by their representatives. The goose was not prized by the ancients as food.

In this country the goose is in best season during September, October, and November; but green geese, in May, June, and July.

Captain Ross found the flesh of the Anser Hutchinsii or smaller Canada goose, to be of a most exquisite flavour. The average weight of this bird is four pounds and a half; it arrives in the neighbourhood of Felix Harbour about the middle of June. Mr. Forster says that Canada geese are very plentiful at Hudson's Bay; great quantities of them are salted, but they have a fishy taste. The Indian mode of killing them is ingenious. Each person conceals himself by putting round him some brushwood; they also set up some artificial geese made of sticks and mud, placing them near themselves as a decoy. When the flock approaches, the Indians imitate the note of the birds, and when they are near enough fire their guns, killing two or three at each shot.*

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* Philosophical Transactions, 1778.

The *Duck*, when well fed and in good season, is one of the best birds we possess; and is suited to almost all tastes, although it may not be suited to all conditions of the stomach. Ducks are in prime season towards November, when they are plump and fat. Those sold in London in May, June, or July are nothing but skin and bone. (*Ude.*) But by artificial means they may be had in their prime about Christmas; and this object is effected in some parts of England by preventing the laying of the eggs until the end of Autumn: they are then hatched and the birds fattened. When ducks are rather old, they are improved by being kept a few days.

The wild duck is not so generally a favourite as the tame bird; but although often lean and fishy, it is considered a delicacy with many. It has reddish-orange slender legs: the legs of the tame duck are much stronger and less brilliant in colour. Wild ducks are taken in vast quantities in *decoys*,—contrivances by which they are allured by trained ducks to enter a stream of water, gradually narrowing, and ending in a net. The most curious decoy is that used by the Chinese: the fowler first accustoms the wild ducks to the sight of a gourd-shell, by throwing several of them on the water frequented by the ducks, and leaving them to float. When the bird approaches these freely, the fowler puts his head into the hollow of one of them; goes into the water and conceals the whole of his body under the surface, keeping his head over it and covering it with the gourd-shell. Thus disguised, he goes amongst the ducks, and pulls them down one by one under water until he is laden, and then retires unsuspected by the rest, which in their turn fall victims to this ingenious fraud.

The king-duck is a beautiful bird which annually resorts to the shores of the arctic regions. It was found to be delicious food by Captain Ross and his people while they resided there. The long-tailed duck was also much prized.

The eider-duck, so much valued as the source of supply of eider-down, is in many countries used as food; and is said to be good.

The Chinese preserve the flesh of their ducks by salting; a process which in this country would be considered quite sufficient to render it hard and worthless.

The *Teal* is favourite game, and is in season about the same time as widgeon.

The *Widgeon*, although its flesh is dark and dry, is well-flavoured, and with many is considered good wild-fowl. It is in season, October, November, and December.

The *Puffin* was formerly allowed by the church to be eaten on Lenten days; but its flesh, unless pickled and spiced, is disagreeable, strong, and fishy.

The *Fulmar* is a bird of a rank, and, to most persons, a disagreeable taste: yet it is a favourite at St. Kilda, where it is salted for keeping. The same practice is resorted to by the Esquimaux and Greenlanders.

The *Penguin* is a bird which frequents the Straits of Magellan in vast multitudes. Admiral Drake's men, in less than a day, killed no less than 3000 of them on an island in these Straits. They are very voracious and feed chiefly on fish. Their taste is fishy and strong; yet those who have no better game have eaten them with a relish. The common penguin is the size of a duck; the great penguin is as large as a goose. The name seems to be more properly *pinguin*, it being derived from their abounding in oil.

The account given by Mr. Pennant of the Patagonian penguin, is as follows:—They are very fat, but taste fishy, not unlike our puffins. As they are very full of blood, it is necessary to cut off their heads as soon as they are killed, in order that it may run out. It is also requisite that they should be flayed, for without these precautions their flesh is scarcely eatable. When salted, it becomes good food. Sir R. Hopkins preserved in this way sixteen hogsheads, which served as beef above two months.

The *Cormorant*, or *Corvorant*, is about the size of a goose: it is one of the birds proscribed in Scripture; and even had it not been so, it is not likely that it would have been much used, so disagreeable is the smell of the bird even when alive, and so rank is the taste of its flesh. The shag, a species of cormorant, is occasionally employed as food; but it is previously subjected to much cookery to render its smell and rankness less disagreeable. Like the gull it is necessary to bury it in the ground some time before it is cooked. The young birds make excellent soup.

Cormorants are trained in China, as they once were in England, to catch fish. A string is tied round their throats to prevent their swallowing the fish altogether.

The *Pelican* is considered excellent food by the Mundingoes, on the banks of the Gambia.* But with the exception of this nation, we do not find that it is esteemed. It is an expert fisher, and like the cormorant is sometimes trained for the purpose of catching fish for the table. The quantity of fish necessary for its own consumption is truly enormous; and when engaged in capturing for its own purposes, it takes more than is necessary for a meal, stocking its pouch in order that it may swallow and digest it at leisure. If in this overloaded state it is pursued, it disgorges its inordinate meal.

The *Soland Goose*, or *Gannet*, is a wild bird well known on the coast of Scotland and other parts of northern Europe. It is smaller than the domestic goose; and its plumage, greatly valued for making feather beds, is white and soft. They frequent Bass rock, an island in the Frith of Forth, in multitudes, to lay and hatch their eggs, and are taken by the following dangerous method:— A man having a rope tied round his middle is let down from the top of the rock until he is within reach of the young birds; for even the old ones will allow themselves to be approached almost within reach of the hand. With a stick he kills all the young birds within its compass; they drop into the sea, and are secured by persons in boats stationed there for that purpose.

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* Moore's Travels in Africa.

The flesh of the old soland goose is rank and fishy; but that of the young is tolerable, and is abundantly used, partly on account of its low price, the average rate being about seven pence each.

At the island of St. Kilda, the soland goose and its eggs are a chief article of subsistence. Flocks of these birds follow the shoals of herrings; for they feed exclusively on fish. The arrival of the herrings is announced by the depredations of the birds.

The *Gull.* Of this bird there are several kinds, most of them are very bad food, being hard and coriaceous, and having a rank and fishy taste. Of this rankness they are in some degree deprived by washing with diluted vinegar and by hanging by the feet so that the oil may run out. They are eaten by the lower orders inhabiting the coasts of Britain, chiefly northward. The bird is sometimes buried in the ground for a day or two before it is eaten. We learn, however, from Captain Ross * that the glaucous gull †, which is abundant in Prince Regent's inlet and the adjoining country, when young, affords excellent food. Although feeding on fish, the young bird is scarcely inferior in delicacy of flavour and whiteness to the tenderest chicken. The old ones are not quite so palatable; they smell most offensively after being kept a day or two.

The Larus tridactylus, or kittiwake gull, inhabits all parts of the arctic regions: it also was found by Captain Ross to be delicious food, perfectly free from any unpleasant flavour.

Order IV. GRALLÆ.

The *Flamingo* is about the size of a heron with enormously long legs; the plumage is scarlet, but the long wing-feathers are black. It is a native of Africa and South America, but occasionally appears in Europe. It was used by the Romans in their sacrifices, and was considered a good bird for the table; for Apicius bestowed on it some of his skill, in his book *De Arte coquinaria,* which so consummate a judge of good eating would not have done had he not thought it deserving of his notice. Pliny says, that Apicius first discovered the value of the tongue of the flamingo, and taught that it is a most delicious morsel. Kolben says, that the flamingoes of the Cape are larger than swans, that their flesh is well-tasted, and that the tongue which is large and fat tastes like marrow. Dampier also speaks in praise of the tongues; but he declares the flesh to be lean and black, although not ill-tasted. The young bird is much preferable to the old, and has by some been compared to partridge. Myriads of these birds have been destroyed for the mere sake of their tongues, which after all have in modern times greatly lost character. Suetonius says that Vitellius was very fond of them: and Lampridius informs us, that Heliogabalus was equally an admirer of their brains. "Lingua gulosis nostra sapit" says Martial.

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* Appendix to Second Voyage, p 34.

† Larus glaucus.

The *Heron* like the crane was once a favourite in England, but it is now scarcely ever used in this country. In France it was formerly set down as royal game, and it is still much prized, especially when young; but it is very necessary to attend to its age when intended for the table, as the bird is said to live sixty years.

The *Crane* was in high estimation amongst the Romans. Cornelius Nepos says, that in his days storks were preferred to cranes; but in Pliny's age the stork was universally rejected and every one prized the crane. In England the crane, once abundant, was such a favourite that there was a penalty of twenty pence for destroying one of their eggs, and the bird was served to the tables of the nobility. So singular are the vicissitudes of taste that the mature bird is now rejected by European nations, its flesh being considered hard, dry, coarse, and ill-coloured, the young, however, are admitted to be delicate eating. Cranes can be taught to assume various gestures, and even to dance. (*Cuvier.*)

Dr. Richardson informs us, that the brown crane and hooping crane are both edible species: and when in good condition resemble the flesh of the swan in taste.

The *Bittern* was once much more esteemed than at present, it is still, however, considered an excellent bird.

The *Curlew*, like most other animals, varies in point of flavour according to the country in which it is found. In Labrador they are very numerous, and are said to be of an excellent taste; sometimes however they are rank and fishy.

The *Woodcock*, a favourite with most persons, is best in winter, and the more especially as at that season it bears being kept until tender, without proceeding too far in the process of decay. They are good only when fat. The most delicate and esteemed parts are the legs and intestines; the fillets are tough and unsavoury. (*Ude.*) This bird is remarkable for the tenderness of its skin.

The *Snipe*, a delicate bird, is much prescribed by physicians for those who have a bad appetite and weak stomach. Unless fat it is worthless. It is in season from October to February.

The *Plover* is a favourite with many; but, owing to a peculiarity of flavour, it is not generally approved. The gray plover is superior, as game, to the green. Roasting is the mode of cookery generally preferred. The golden plover when fat is said by Dr. Richardson to be the most delicious bird in the country round Hudson's Bay.

The *Landrail*, or *Corncrake*, is less known by its appearance than by the sound of its voice, which although inharmonious is connected with various pleasurable associations, arising from its being the herald of the most delightful season of the year. While the growth of the meadow is advancing, the stillness of night is agreeably interrupted by the monotonous, but not dull, croak of this pretty bird. It is very swift of foot; and when pursued, trusts more to its running through the deep grass, and to its ingenuity in deceiving the sportsman, than to its wings.

When the landrail is in good condition, it is esteemed a first-rate delicacy. It weighs, when fully grown and fat, nearly half a pound.

The *Bustard* is a large bird weighing generally thirty pounds. It was once so common in England that flocks of fifty might be seen in the air at a time; but it has now become very scarce. Along the shores of Europe washed by the Mediterranean it is still abundant. They take to the wing badly as they are generally very fat, and on this account they are easily run down by greyhounds. It is expensive fare; for even in Paris, where they are much less scarce than in any part of the British Isles, they cost four or five pounds each. Capt. Cook discovered a bay on the coast of New Holland which, on account of the multitudes of bustards found, he named Bustard Bay: they were as large as turkeys, and he considered them the best bird he had got from the time of his leaving England.

The *Ostrich*, the largest of all birds, standing about seven or eight feet high to the top of his head, affords an abundant banquet to many savage nations of Africa, but of a kind that would not be much relished in Europe. The female is less coarse than the male, and the young ones still less so than the females: hence they are kept in a tame state for the sake of breeding. They are often hunted. Such is their speed that it is said no animal but a horse can overtake them; and this speed will be little retarded even when the bird carries two men on his back, for ostrich-riding is common. They are often taken by a man dressed in an ostrich skin. The ancients killed them by planting pointed stakes round the nest of the female during her absence, on which she impaled herself by her efforts to return. The Romans used their flesh as food. In Bornou it is esteemed the greatest delicacy. The Patagonians also make use of the species found in their country. When the Arabs have killed an ostrich they cut open the throat, pass a ligature round it, and by shaking the bird, cause it to disgorge nearly twenty pounds of a substance mingled with blood and fat, of the consistence of coagulated oil, which is called *Manteque,* and which is employed in the preparation of their dishes, as well as in the cure of maladies. (*Cuvier* by Griffith.) The ostrich was proscribed in Scripture, as an unclean bird.

Order V. GALLINÆ.

The *Peacock,* so great a favourite with the Romans, and so great a sufferer by the wanton destruction of them by some of the emperors, as has been noticed in a preceding part of this volume, is now scarcely used. Except when young, it is insipid and dry; and even in its prime, which is at the age of three years, it is in the opinion of most people exceeded by our domestic poultry. This bird is sometimes, but rarely sold by the poulterers of London. The hen is preferred to the cock. If about three years old, and weighing nine or ten pounds, it will sell for fifteen or sixteen shillings. It most resembles pheasant in flavour, and is brought to table more for novelty than for the value set on it as food.

The *Turkey.* The wild turkey is rather a handsome bird, with lively plumage. Its size has been variously represented, some have been said to weigh sixty pounds; but Mr. Pennant conceives that forty ought to be considered a large bird, and Catesby found very few to exceed thirty. They fly in flocks of 500. In March they grow so fat that they cannot fly more than three or four hundred yards, and are soon run down by a horseman. In the unfrequented parts bordering on the Missisippi they are so tame as to be shot with a pistol.*

The flesh of the wild turkey is said to be superior to that of the tame, although more red.

The domestic turkey needs no description. It is a stupid, cowardly, and quarrelsome bird. Every one has seen and smiled at the vast dignity and pomposity of the silly turkey-cock when he throws back his ensanguined head, bristles up his feathers, drops his wings, struts about most ridiculously, wheels about with his wings rustling along the ground, and threatens all that approach him with his very inharmonious gabble. His anger is greatly excited by any thing red. The hens are excellent nurses and affectionate mothers, but the poults are difficult to rear.

The flesh of the domestic turkey is white, tender, delicate, nutritious, and of so excellent a flavour that it is an universal favourite. The hen is preferred for boiling; if she is old, her legs will be rough and red. A young turkey-cock is known by his smooth black legs, and small spur.

The *Domestic Cock*. Our farmyard cock and hen need no description; nor need any one be told of the important place they fill at our tables. Enough has already been said of the cruel processes resorted to in order to render them corpulent. It would be well for the breed, if society would be satisfied in all cases with fowls fattened according to the following instructions of M. Ude:—"The manner of fattening fowls is to separate them from the other chickens; mix together some oatmeal, milk, boiled potatoes, and bread; add to the whole of it a little dripping; mind not to give them too much at a time, and not more than twice a day; and above all, keep them very clean. When they are sufficiently fattened, kill them, or they will fall ill and die. When you find any of your poultry sick, chop a few leeks with their food. But when they become very fat, if you do not kill them, they will inevitably rot and die away."

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* Philosophical Transactions, 1781.

It is a common opinion that the flesh of white-legged fowls is finer, and the skin more tender. Mr. Dolby prefers those with black legs for roasting, and those with white ones for boiling. It is probable there is more of fancy than reality in these whimsical distinctions. M. Ude says, "A fine fowl may be known by a skin of bluish hue marbled with gray." This valuable bird is in season the whole year round: there are few things worse than an old one.

The *Pheasant* is often domesticated for the table; but in that case it is inferior in flavour to the bird in its natural wild state, which consequently is more valued. M. Ude says, "It is not often that pheasants are met with possessing that exquisite taste which is acquired only by long keeping, as the damp of the climate prevents their being kept so long as they are in other countries. The hens in general are most delicate. The cocks show their age by their spurs. They are only fit to be eaten when the blood begins to run from the bill, which is commonly six days or a week after they have been killed. The flesh of the pheasant is white, tender, and has a good flavour, if you keep it long enough; if not, it has no more than a common fowl or a hen."

The Pheasant is in season from October to February.

Grous is of several kinds, all of them good, and some excellent. The large capercailzies or wood-grous, once natives of the pine forests in Ireland and Scotland, have been exterminated within the last half century, but are still found abundantly in the forests of northern Europe. The grous brought to the London market is best in August. Mr. Forster* informs us, that the grous of Hudson's Bay are so stupid that they may be knocked down with a stick. In summer they are good eating; but in winter they taste strongly of the pine spruce, on which they feed during that season, eating berries in summer.

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* Philosophical Transactions, 1781.

The *Ptarmigan*, or *white grous*, frequents the mountainous districts of Europe and America: they are found in the British Isles; but the London market is supplied from Scotland and Norway, those from the latter country being preferred. When young it is excellent food. The Hudson's Bay ptarmigan weighs a pound and a half, and is the same as the European. It changes the colour of its plumage in winter, being then white. At Hudson's Bay they go together in great flocks in the beginning of October, and are so plentiful that seventy of them are often taken in a net at once. They are excellent eating. Mr. Forster says that they are as tame as chickens there, and are driven into the nets by men without any difficulty or attempt to escape.*

The ptarmigan when trussed is not discoverable by shape or size from the common grous, and the flavour is but little different.

The *Partridge* should be chosen with a dark-coloured bill, and yellow legs; for these are the proofs that the bird is young, but it may be young even though the legs be grayish. Old birds are perfectly worthless. There are no less than fifty different modes of dressing this bird, given by Mr. Dolby. The red-legged partridge is very scarce in England. The common partridge is in season from September to February.

The mode of killing partridge in Tunis is curious, and is thus described by Dr. Shaw:—Instead of springing the game with dogs, the fowlers shade themselves with a piece of canvass stretched upon two reeds, and painted with the figure of a leopard. Thus concealed, the fowler walks through the brakes [illegible] avenues, looking through some holes a little below the top of the screen, to observe what passes before him. It is remarkable that the partridge and some other birds, on the approach of the canvass, covey together; thus the sportsman has an opportunity of coming near them, when resting the screen on the ground, and directing the muzzle of his piece through one of the holes, he shoots a whole covey at once.

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* Philosophical Transactions, 1772.

Quails are caught with nets, and are often fattened in cages. In the shops of the London poulterers, they sell at the enormous price of 3*s.* each when fattened. The island of Capri, formerly Capreæ, in the gulf of Naples, produces such vast numbers of them that, as its bishop's income was formerly paid from the profits arising from them, the island is sometimes called the bishopric of quails. Beside the domestic consumption of them, so many as 100,000 have been sent in one year to the markets of Naples. In the Greek islands they are preserved in vessels filled with fat. Quail fighting was one of the sports of the Athenians; but they had a prejudice against the bird as food, conceiving it unwholesome on account of its feeding on helebore. Quails are in best season in February and March. This bird may be ensnared by sounding a quail pipe, an instrument made to imitate the voice of the hen. M. Ude says, "Quails in my opinion have no flavour; it is only their rarity that makes them fashionable." Some, however, esteem them when they are fat.

Order VI. Passeres.

The *Pigeon.* This bird is domesticated and bred in vast numbers in most farmyards. When young, and in good condition, it is prized by many as food; but is not a universal favourite. The old bird is tough, dry, and insipid The tame pigeon is considered preferable to the wild; the flesh of the latter is dark coloured. Mr. Dolby gives no less than fifty formulæ for cooking these birds. They are costly food, for they consume a vast quantity of grain.

The *Skylark*, a superior songster, is much sought after in most countries where it abounds. The London market is amply supplied with them; and those from Dunstable are particularly valued. The larks of Germany are peculiarly fine, and it has been said that a German lark-epicure will travel a journey of several hundred miles for the sake of a meal of them. It is in winter that they are captured. They are destroyed in great numbers by the singular effect which a strong light has upon them as well as on many birds and quadrupeds. Mirrors are made to revolve upon an axis, and nets are placed round them. The rays of the sun being thus brought upon all surrounding objects, the larks fly towards the mirrors and are captured in the nets. On the same principle, it is a common occurrence for larks to fly in the beam of the reflectors fixed in the lighthouses of our coasts with such violence, although at night, that striking the plate-glass windows, they fall dead or are stunned. Wild-ducks sometimes even break the windows. At one of the lighthouses at the South Foreland near Dover, 127 birds, of which above 100 were larks, were thus destroyed within three hours one dark night in November. During October, November, and December they are in best season. They are generally larded and roasted, but there are sixteen modes detailed in treatises on gastronomy for rendering this little morsel more attractive.

The *Stair*, or *Starling*, is an exceedingly pretty bird, and on account of its docility is kept by those that fancy domestic favourites. They are occasionally brought to table; but the flesh is poor, and the bird is much better fitted for a prattling companion than for food.

The *Thrush* was a prime delicacy amongst the Romans, and fattening them for the table was practised according to the rules of art. They were confined in a kind of apartment where multitudes were crowded together, the great object being to cut off all connection with the external world by turning the windows away from the sight of the groves which originally they had inhabited, and even shutting out the light, except what was barely sufficient to render their food discernible. Here, in a gloomy captivity, their appetites were pampered until they became very fat; and then they were allured into another chamber, lest the other birds should fret and fatten less rapidly by seeing their companions in misfortune roughly handled. They were then killed for the table. In England, although its merits at table be acknowledged, the delight of its note is more generally preferred. The same may be said of the blackbird. In many countries, particularly France and Germany, the thrush is considered a delicacy and much sought after. Great quantities of these birds are caught for the table in the island of Candia.

The *Ortolan* is a small singing bird never found in Great Britain, but common in France, Italy, and other parts of Europe. It is the epicure's prime morçeau, and on this account is treated as he treats all his favourites, with cruelty. The birds are shut up in a dark room, with as much candle-light as suffices to render darkness visible. Here having no other employment or enjoyment they amuse themselves with inordinate eating, and would at length kill themselves, but that the knife interposes when they have reached the desired point of obesity. They are eaten with the intestines in them, and are generally roasted. In this country, where the bird is rarely procurable, its cost is considerable, and on the list of delicacies it ranks with turtle: —

> "Cawthorn had once a mind to fix
> His carcase in a coach and six;
> And live, if his estate would bear it,
> On turtle, ortolans, and claret." *The Lottery.*

The *Stonechatter*, although an insignificant little bird, is prized by lovers of curious eating.

The *Wheatear* is very common in England at certain seasons, and is captured in great numbers. These birds are known under the name of English ortolans, and are often sold at a high price.

The *Redbreast*. This beautiful bird, which enlivens the dreariness of winter with his song when almost all other birds are silent, and whose familiar manners and reliance on the generosity of man have been the cause of his protection throughout Britain from the destroying hand of the epicure, is extensively consumed in France, and considered excellent.

The *Nightingale* is not protected by his master-music from contributing his delicate morsel of flesh to the tables of the rich.

The *Swallow* is much used as one of the trifles of the table. But there is a kind of swallow common in several oriental countries which builds a nest of a very curious nature; and not the least singular part of the history of this nest is, that it is considered a prime delicacy for the table. The traveller Forbes in describing a small island called Sacrifice Rock, gives the following account of these edible nests:—"It is famous for the edible birds' nests found in the clefts of rocks, which are esteemed so luxurious a dainty in China as to have become a considerable article of commerce; the greatest quantities are produced on the coasts of Malacca. These nests are three or four inches in circumference, and one in depth; formed by a bird of the swallow tribe, either with the spawn of fish, or a glutinous frothy scum which the sea leaves on the rocks. The newest and most transparent nests of the hirundo are purchased by the Chinese at five or six dollars the pound."* In the Journal de Pharmacie, August 1836, there is an interesting article on the origin of these nests by M. Virey, in which the author combats the common opinion that they are formed of certain gelatinous *fuci*, softened in the craw of the swallow, at the time of laying its eggs, and then disgorged and moulded into the form of the nest. He comes to the conclusion that Kœmpfer, Rumphius, and others had arrived at before, that the sea-swallow by a natural instinct collects, from the surface of the waves and the rocks washed by them, the gelatinous materials of zoophytes or marine mollusca for the construction of its nest. And in fact the seas of the Indian Archipelago, as well as those of the Philippine and Sunda Isles as far as New Guinea are covered with sheets of zoophytes and mollusca, to the extent of many leagues, which to the navigator appear white at a distance. Willoughby conceives this gelatinous matter to be the spawn of whales.*

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* Oriental Memoirs, i, 203

These edible nests are found on the shores of Cochin China, Java, and the Indian Archipelago. The Chinese pay at the enormous rate of 7*l.* 14*s.* in our money for one avoirdupois pound, to supply the tables of the Mandarins and nobles. Batavia alone exports 4,000,000 of these nests annually, and as each nest weighs about a quarter of an ounce, it is easy to calculate the enormous value of this branch of commerce.

These nests readily dissolve in water, except a small quantity of impurities. Some of them are so pure that they are almost transparent, and consist of layers adhering together. Dissolved in chicken or mutton broth, they are considered an exquisite dainty, and in the dissolved state, they are used for various sauces, certain spices being added. For valetudinarians or consumptive persons it is counted a delightful restorative. It is sometimes found at the tables of the wealthy and luxurious even in Britain.

EGGS.

Having described such birds as are most used as food, it will be proper to make some observations on eggs, which add so much to the comforts and wants of man. The import of eggs for the London consumption alone is enormous: they are brought into England from Denmark, Holland, Belgium, France, Guernsey, and Jersey. The duty, at 10*d.* on 120, amounted for the year 1829, to 22,189*l.* France alone sends us about 60,000,000 of eggs annually, value probably 83,000*l.**

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* M'Culloch.

The duty paid at Ramsgate, for three months only, has amounted to 2000*l.*[*]

Eggs may be preserved by the well-known process of greasing the shells, or by immersion in a thin mixture of lime and water, the whole being contained in a glass vessel well corked and cemented. By this process M. Peschier kept eggs perfectly fresh for six years. These methods probably act by excluding the air, — an agent which greatly promotes putrefaction. However close the shell of an egg may appear, it is, in reality, very porous; for if an egg be laid on the naked fire, and attentively watched, the albumen may be often seen forcing its way through the pores before the shell bursts. At Herculaneum, egg-shells were found perfectly unbroken, yet empty, which proves that the contents must have evaporated through the pores.[†] And Mr. Boyle found eggs to grow sensibly lighter by being kept.[‡] In Scotland it is common to preserve eggs by dipping them into boiling water, in order to destroy, as is said, the vital principle; but, more probably, to coagulate a stratum of albumen next the shell, and thus to obstruct the entrance of air through the pores.

Eggs are very prone to absorb odours and flavours, and therefore must be carefully protected. A newly laid egg, left in mahogany shavings, will shortly acquire a flavour that will prove quite disagreeable to the taste; and it is well known that musty straw speedily imparts a very unpleasant flavour.

Edible eggs vary very much in size; some naturalists have said that the egg of the ostrich weighs fifteen pounds; but one laid in the menagerie of Paris, as large as any brought from Africa, weighed but two pounds fourteen ounces: it held a pint, and was six inches deep. (*Cuvier.*) The smallest hen-egg weighs about one ounce and three quarters; the average is two ounces and a quarter; and the largest that ever occurs weighs three ounces and a half. The green-coloured eggs, sold in London under the name of puffin's eggs, weigh a quarter of a pound; and plover's eggs do not exceed an ounce and a half on the average.

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[*] Morning Herald. [†] Phil. Trans. 1751. [‡] Works, i. 398.

The sensible qualities of eggs vary materially. The albumen of a hen-egg coagulated by boiling is a beautiful opaque milk-white substance; that of a duck-egg is slightly transparent; and that of a puffin almost entirely so. The albumen of a duck-egg coagulates with less heat than that of the hen-egg; and, therefore, ought not to be boiled for so long a time. In frosty weather all eggs require a longer time to coagulate the albumen than in warm weather, the difference being about half a minute. The egg of the ostrich is of a sweetish taste; it is gross, and soon satiates the appetite; but they keep longer than hen-eggs. (*Cuvier.*) Lieutenant Paterson found a nest at the Orange River in the country of the Hottentots, containing thirty-four fresh ostrich eggs, which he declares were excellent food.* The egg of the goose is strong, yet not disagreeable; that of the turkey is almost as mild as the hen-egg; that of the duck is glutinous, and not quite so delicate. The eggs sold in London, under the name of puffin eggs, are exceedingly glutinous, yet have a pure taste, with scarcely any fishiness. The egg of the woodcock, lapwing, and ruff are much esteemed. Plover eggs, little more than half the size of a good hen-egg, are sold in London at 5*s.* per dozen. The eider duck-egg is an Icelandic delicacy; that of the Soland goose is a favourite in Scotland; at St. Kilda, Soland-goose-eggs are consumed in immense quantities. The egg of the Guinea hen is smaller and more delicate than the common hen-egg. Eggs of the awk, the coot, the goosander, the pied oyster-catcher, and a few others, are eaten in various parts of Europe, but having not much to recommend them, they need not be described. The egg of the cormorant is as bad as the flesh of that bird.

In general, eggs are esteemed for their freshness, and the absence of all ill smell, — a quality which, without artificial means, it is impossible long to preserve. But in some countries, freshness is little prized; and we are told that the Tonquinese, on the contrary, much prefer them when they become capable of gratifying two of their senses, — nay, when a third sense becomes engaged, and they can discover by the ear that something more solid than a mere egg gives employment to the teeth.

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* Travels, p. 142.

The shell of the ostrich egg is thick, and by age grows as hard as ivory: drinking cups are made of these shells.

This section shall be concluded by showing the different degrees of estimation in which some of the birds described in the foregoing pages were formerly held by the people of England. The comparison will be best made by reference to the prices at which they were sold about five centuries ago. A swan was sold for 3*s.*, a crane for 1*s.*, a heron for 6*d.*, a pheasant for 4*d.*, a goose for 2½*d.*, a fat capon for 2½*d.*, a facock for 1½*d.*, a mallard the same, a plover 1*d.*, two pullets or two woodcocks for 1½*d.* [*]

SECTION III.

Class III. *Amphibia*. Order I. REPTILIA.

The Turtle. Of the different kinds of turtle, one only affords good food: it is called the green turtle, because it affords the much celebrated "green fat;" it is a gentle and harmless animal, very different from some of the other species. It is occasionally found of a very large size, being sometimes seven feet long; and it varies from 56 pounds to 800. Its strength corresponds, for a turtle of the largest size can easily walk while supporting five men on its back. The islands of the East and West Indies, and numberless other islands, abound in them; those along the coast of Cochin-china are not only plentifully supplied with them, but they are of an exquisite flavour; and so highly prized are they, that serious conflicts are said to occur between the inhabitants of these parts to obtain them. They form a considerable article of commerce between the West India Islands and Great Britain, and the ships engaged are provided with proper accommodation to permit their being brought over alive, and in tolerably good health. They generally frequent the waters of the coasts; but they frequently enter the mouths of rivers, or go on land to considerable distances, in order to deposit their eggs. These eggs are perfectly round, and some affirm that they lay the almost incredible number of 1000 in a season, of the size of a small hen egg. Vast numbers are taken by various birds and beasts, and also by man, yet the number hatched is considerable; and even comparatively few of these are permitted to crawl to the sea, such havoc is made on them by sea-birds during their perilous journey.

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[*] Echard's History of England.

Green turtle is a well-known delicacy; not only is it delicious to the taste, but it is exceedingly wholesome. Of this latter fact we have a good proof in the circumstance related by Anson, that his crew subsisted on them for four months.

The method of capture practised by Anson's men at Quibo, and afterwards on the coast of Mexico, is still practised generally. One mode was as simple as successful: while the turtles were on the beach, occupied with scratching holes in the sand, and covering their eggs in them to be hatched by the sun, the sailors turned them on their backs, a position from which they can, with difficulty, recover themselves. When they had turned a sufficient number, they brought them away at their leisure. The other method was to search them out as they floated asleep on the surface of the water, during the heat of the day. On discovering them, they sent a boat with an expert diver, who, plunging into the water from some distance, rose beside the turtle, and seized it by the shell. The turtle awakening, supported both the diver and himself, by striking the water with his feet, until the boat arrived, and took them in. Had the boat rowed up at once, the turtle would have awoken, for it is very easily disturbed from its slumbers. A very ingenious method of taking the turtle, while asleep, is practised on the coast of Mozambique. The pilot sucking-fish has the power of fixing itself to any substance, or to another animal, with a degree of force not easily overcome; in the same way nearly, some suppose, as the leech attaches itself. A ring, with a rope attached, is put round the fish near the tail; the fish, so prepared, is brought in a vessel of water to where the turtles lie asleep. At a certain distance the fish is thrown from the boat: it swims to the turtle, and with the view of making its escape fixes on it. The rope is then drawn, and the captive turtle is secured. Another curious mode is in some parts practised: — a diver surveys the shallow water, and seeing a turtle feeding at the bottom, dives, seizes him, mounts astride on his back, presses the hinder parts downwards, and directs the head upwards. The turtle, striking the water with his feet, rises to the surface, and thus emerges the diver, like some sea deity, seated on his tortoise-shell chariot. The turtle is also occasionally taken by the harpoon. In countries where they abound, their flesh is as cheap as that of almost any other animal.

Many are the methods of cooking the turtle adopted by the various professors of the art of tempting the appetite beyond the bounds of moderation. These, however, may often be considered as modes of rendering a naturally light and salubrious article of food pernicious, and less easily digestible. It is said that a simple steak, broiled or fried, is one of the best forms of this kind of flesh, and seems, also, to be the most wholesome: it is thus used in the West India islands. The eggs are much esteemed, and differ from a bird's egg in one striking particular; that the albumen, if such it may be called, does not coagulate by boiling. The turtle is a valuable addition to the live stock of a ship at sea: or the flesh may be salted, and preserved a long time: in this state it is much used in the West Indies and America.

There are several other kinds of turtle; the hawk's bill is the smallest of them; the shell is very much superior to that of the other species, and constitutes what is called *tortoise-shell.* It is a ferocious creature, and defends itself with vigour. Its flesh is both ill-tasted and unwholesome; it produces considerable disturbance of the constitution. Dampier first pointed out the difference of the turtles with respect to salubrity; for, previously to his time, there was little discrimination of the different kinds. The Loggerhead, or great Mediterranean turtle, is the largest of all the species: its flesh is coarse and very inferior, yet is eaten by the lower orders on the shores of the Mediterranean, and on parts of the American coast. The eggs, however, are tolerably good food. It abounds with excellent oil: it bites furiously, and holds so obstinately, that the head may be cut off, without causing it to let go.

The Tortoise is of two kinds; the fresh water, and the land tortoise. They are all slow, stupid animals, remarkable only for their living to an extraordinary age. We have accounts of one which was known to have lived 120 years. The land tortoise is considered a great delicacy, and its eggs are much relished. The fierce tortoise, a variety of the fresh water species, is considered equal, as food, to the green turtle.

The tenacity of life evinced by these animals is truly surprising. Redi made an opening in the head of one of them, and took out the whole brain. In three days the wound was covered in by skin, and in this state the tortoise lived and walked about for six months; but its eyes never opened after the loss of its brain. After this cruel treatment, the head was cut off, and lived for a quarter of an hour thus separated; but the body lived for twenty-three days without its head. Humanity shudders at these useless and harrowing experiments, which prove little beyond the flintiness of the heart that could support a man under the execution of them.

Captain Stedman says, that the land turtle of Surinam, when it sees danger, shrinks within its shell; and that in this situation the Indians put it on the fire, and broil it until sufficiently done, which is known by the separation of the under shell from the upper. He knew four of these animals to be kept four months without nourishment, yet they remained vigorous to the end of that time.

Pliny tells us that a part of Carmania was inhabited by people called Chenophagi, because they fed on the flesh of tortoises; and he adds, that they covered the roofs of their houses with tortoise shell. This seems a little apocryphal; but not more so than his description of these tortoise-eating people, for he informs us that their bodies were covered with hair, but that they had none on their heads, and that they had no clothing but fish-skin. To these wonders relative to the tortoise may be added the death of the tragic poet Æschylus, who ended his career by the falling of a tortoise on his bald head, which an eagle aloft had let fall.

The *Crocodile* is the most formidable of the lacertine reptiles; in size, strength and hideous appearance, he may vie with every other animal. Yet with all his powers, he is a coward; Seneca says of him, "the crocodile pursues whatever flies, and flies from whatever pursues." This reptile is often thirty feet long. His enormous mouth, constituted by jaws one quarter the length of the whole body, disclosing a terrific array of teeth, gives an awful announcement of the treatment which any captured animal is to expect. He has four short legs, terminating in toes and claws, but they are so ill contrived for motion on land, that he can scarcely overtake a man in running. The body is nearly covered with hard scales, constituting an almost impenetrable suit of armour; but where this is deficient, he is easily vulnerable. The male eats his own young when he can find them. Every sort of animal is welcome food to the crocodile; and none more so than man. After seizing on a man, the crocodile plunges with him to the bottom of the river, and there is enacted a scene easily understood. But in order to devour his prey, he brings it to land; for it is said he cannot eat in the water: it is also believed that he leaves it to putrefy before he makes his repast.

Amongst the facts related by Herodotus relative to these creatures, he says that, "the inhabitants of the Thebais, and of the shores of the lake Mœris, regard them with the highest veneration. Each person rears a crocodile, which they train to the hand, and from its ears suspend clustered jewels and gold, and encircle the fore feet with rings. It is fed with the utmost possible delicacy and care, upon bread and the flesh of victims; and when it dies, it is embalmed, and placed in some sacred repository: but those who inhabit the territory of Elephantine, eat the crocodile. Crocodile-taking is thus conducted: — having baited a hook with the chine of a pig, the sportsman lets it down into the mid-stream of the river, while he stands on the brink, having with him a living pig, which he strikes. The crocodile, hearing the cry, follows the sound, and meeting the chine, swallows it. The people then draw him ashore, and the sportsman blinds his eyes with mud, and easily accomplishes his object."

The crocodile, hideous and forbidding as it is, furnishes, in several countries, food to man; which, if the animal be young, is said to be good, provided that it has not the musky flavour. For the most part this flavour is present, and is often so strong as to infect the waters where they are. The flesh is much relieved of the musky taste, by removing the scales from the breast, previously to the death of the animal. But the removal of the musk glands is absolutely necessary, as otherwise the flesh would be insupportable. The Berbers set the greatest value on these glands, and use them as a perfume for the hair.

The negroes consider the flesh of the crocodile excellent food, and pursue the animal with unceasing assiduity. The preference seems mutual; for amidst the general relish for man's flesh evinced by the crocodile, he is said to distinguish that of the negro with an especial predilection.

The Mundingoes, inhabitants of some districts on the banks of the Gambia, are very fond of crocodile's flesh, but they are still fonder of their eggs, and think an egg particularly delicious if it contains a young crocodile of the length of one's finger.* These eggs, which are not much larger than those of a goose, are a great delicacy also amongst the negroes and the Arabs. The account given by M. Linant of these eggs is as follows: —"Walking along the banks of the river, I saw on the sand the recent track of a very large crocodile, and thinking that possibly it might have been a female come ashore to lay her eggs, I followed up the track about twenty paces along the water side, where the ground appearing to have been much trodden, and recently disturbed, I dug and found ninety-nine eggs. The Arabs are in the habit of saying that ninety-nine is always the number of the crocodile's eggs; but I have found them of various numbers between sixty and ninety-nine. My people, and those of the place, immediately made a fricassee, which I tasted but found very nauseous, having a flavour between rancid oil and musk. Each egg had considerably more white than yolk."†

In Burkhardt's travels the following passage occurs: "At Sennaar, crocodiles are brought to market, and their flesh is publicly sold there. I once tasted some of the meat at Esne, in Upper Egypt; it is of a dirty white colour, not unlike young veal, with a slight fishy smell; the animal had been caught by some fishermen in a strong net; and was above twelve feet in length. The governor of Esne ordered it to be brought into his court-yard, where more than 100 balls were fired against it without any effect, till it was thrown upon its back, and the contents of a small swivel discharged into its abdomen, the skin of which is much softer than that of the back."

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* Moore's Travels

† The above passage I have extracted from a periodical, not having been able to procure the work of M. Linant.

Some parts of the crocodile are said to be white and delicate, and to have the appearance of the best veal. Dr. Ruppell, however, represents this kind of meat as so strong and musky that he never could eat it without discharging his stomach after it.

The *Alligator*, an animal so much resembling the crocodile that they were at one time supposed to be the same, is used as food in several countries, and certain American tribes derive even their chief support from it. The flesh is white and delicate in appearance, but its taste is musky, like that of the crocodile.

The alligator possesses strength and ferocity in an eminent degree, and uses both against man upon all occasions that offer. There is a river in Sumatra famous as the resort of them. Mr. Anderson relates that, some years since, Captain Peake was in a canoe on this river with ten men. Two alligators with open mouths approached, which occasioned such confusion that the canoe was overset, and the captain and a few of the men were instantly devoured. One of these alligators was afterwards repeatedly seen during two days, lying on the side of the river, with the legs of the unfortunate captain projecting from its mouth. * He also says, that in the Assahan river of Sumatra the alligators are numerous and bold, and that it is common to see them raise their heads a foot or two out of the water and pull people out of the boats. On one occasion three horses and six goats were upset in a boat, and were devoured in an instant. But a fact stated by him proves that their ferocity arises, as in the case of many other animals, from their necessities, and the large quantity of food necessary for their support; for if this be supplied they become gentle. "Near the mouth of the river there is an alligator of a most prodigious size, his back, when a little out of the water, appearing like a rock. He remains constantly there, and is regularly fed upon the heads and entrails of large skate-fish caught there. I saw him; and the Malays called him to his meal. He appeared full twenty feet long. The Malays assured me he was quite harmless, so much so that his feeders patted his head with their hands, a dangerous amusement certainly; but showing the wonderful tameness and sagacity of the creature, naturally ferocious. He will not allow any other alligator to approach the place, and on that account the Malays worship him."* This fact, now rendered incontrovertible by Mr. Anderson, restores the shaken credit of the statements of Herodotus relative to crocodiles.

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* Mission to Sumatra, 338.

The *Guana*, or eatable lizard, is a formidable looking, but really gentle and harmless reptile, somewhat resembling a small crocodile in appearance. It is often four or five feet long; is covered with scales, and is of a greenish colour, sprinkled with black spots. It is a lively creature; creeps up trees with great celerity; robs birds' nests; and, for the most part, lives in the trees. It is common in South America, parts of Africa, and in the Islands of the Indian Ocean; and was formerly abundant in the West Indies, but is now more rarely met with there, owing to its being much sought after as food. It is admitted universally by the inhabitants of all countries, from the Negro to the European, to be one of the greatest delicacies of the countries where it is found; and its flesh is salted and exported in large quantities. Its eggs, as some represent, are of an exquisite flavour, and are about the size of a pigeon's: great numbers are laid by one animal. Guanas are hunted by dogs, or snared: they are attracted by certain sounds, for instance, whistling. The flesh is cooked either by boiling or roasting, and in either way is excellent. The account given by Ulloa is not quite so flattering. He says, that it is the common food at Panama; that the flesh is exceedingly white, and its taste sweet; but that it has a nauseous smell. The inhabitants compare it to chicken; but he could see no resemblance. He describes the eggs as viscid, and of a very disagreeable taste, although eaten there.* This creature is remarkably tenacious of life, and endures dreadful suffering before it dies. If taken young it is easily domesticated.

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* Mission to Sumatra, 123.

Lizards of other kinds are eaten in various parts of the world. The Birmans, Tonquinese, Bedouins, the Negroes of the coast of Guinea, and the natives of the Andaman Islands eat them greedily, without being solicitous as to whether they are the edible species of lizard or not. Nor is any caution necesssary, for none of them are injurious, although the contrary has been sometimes supposed.

The Frog. This reptile, although not destitute of a peculiar kind of beauty, is rather uninviting when considered as food: at least, so it is viewed by those whose prejudices have not been removed by experience of the different value set on it in other countries. There are several varieties of frogs, and almost all are used as food by different nations of the globe. Belgium, France, Italy, Germany and Austria, are the chief European countries in which the consumption of them is greatest, and in these the species called *esculent* is the only one prized These are said to have the best flavour: the hind quarters are the parts most valued, and the form of cookery is the fricassee; but the livers and fore-legs, along with other meats, are used for soup. They are considered a luxurious delicacy, and a dish of this kind costs no trifling sum. They are brought alive in thousands to the capital cities, in some of which there are regular conservatories for preserving them alive. The common frog is inferior, but is also eaten; and is often fraudulently substituted for the former species. The bull-frog, which is comparatively of gigantic dimensions, being eighteen inches in length, and sometimes upwards, is found chiefly in North America, and is there eaten. Frogs are used as food throughout China and Cochin-china; and several species are made use of by the natives of King George's Sound.

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* Voyage i. 124.

The Javanese employ the heart of a frog, named Kadok-kesse, for preparing a poison. The blood of other reptiles is also considered as venomous, and is used for poisoning daggers.*

The frog is very tenacious of life. Mr. Boyle cut out the heart of one: it leaped about, and swam as before, its heart being in Mr. Boyle's hand; but, he says, they cannot survive the loss of the brain.† Others have affirmed that it will live and jump many hours without its head.

Frogs and frog-soup were prescribed by Dioscorides against the poison of all serpents. On the Continent, frog-soup is recommended for consumptive persons, as a kind of nourishment less stimulating than other animal food; and it is very probable that the quality attributed to this kind of diet is really possessed by it.

The Toad very much resembles the frog; but it is more ugly, and its deformity is rendered more loathsome to those who entertain the mistaken notion of its being a venomous reptile. It is true that a frothy juice exudes through the pores in the back when the toad is irritated; but it is generally believed that this is not poisonous. "The size of the toad with us, (says Dr. Goldsmith,) is generally from two to four inches long; but in the fenny countries of Europe I have seen them much larger, and not much less than a common crab, when brought to table. But this is nothing to what they are found in some of the tropical climates, where travellers often, for the first time, mistake a toad for a tortoise: their usual size is from six to seven inches."

Toads are said to have been found encased in blocks of stone, and alive, without any visible means of entrance

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* Journal de Pharmacie.

† Works, i. 28.

—a circumstance quite inexplicable, but supported by numerous and respectable testimonies.

Lizards have been known to live under the same extraordinary circumstances. Some years since a workman employed in sinking through a seam of coal 150 ft. below the surface of the ground, perceived his pick to break into a small cavity in the coal. On examining the cavity he found a small live lizard encased in the coal, which on being brought into the air soon after died.*

The hind-legs of the toad are eaten in some countries, and are not found in any respect prejudicial. The Negroes on the coast of Guinea are not so select as to be satisfied with the legs, but devour the whole reptile.

Order II. Serpentia.

The Boa. Notwithstanding the hideous appearance of, and the terrific associations connected with these creatures, they are eaten by many nations. The huge boa, the prince of serpents, which makes but a meal of a deer, an antelope, or a man, and sometimes grows to the length of 60 feet, although more generally it does not exceed 30, is considered a delicacy by the Negroes. When the boa has gorged himself with any large animal, it is helpless, and easily destroyed; but Koster denies that it is ever torpid on these occasions.† In this state, it is killed by the Negroes, and furnishes substantial food in abundance, preferred by them to almost any other. On the other hand the boa is said to prefer negroes to other men, and will swallow a whole negro at once. This serpent has no poison-fangs. Roggewein speaks of amphibious serpents at Ceylon, eight or ten yards long, and five yards in circumference, with throats sufficiently capacious to swallow a stag whole. He says they are killed by the natives as they lie asleep, their flesh being esteemed good eating. These were, no doubt, boas. The breath of this creature is disgustingly fetid, and infects the air to a great distance.*

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* Philosophical Magazine, LII 377.

† Travels in Brazil, 293.

The *Rattlesnake.* So dreadful is the poison of this serpent, that it is adequate to kill a man in a few minutes, and his death is preceded by frightful sufferings. So tenacious is it of life, that a rattlesnake dissected by Tyson, lived several days after its skin was torn off, and most of its viscera removed. In some parts of North America the Indians broil them in the manner of eels, and eat them. Their flesh is said to be white and delicate. While the rattlesnake is asleep, they fix him to the ground; and, by inducing him to fasten his fangs in a piece of leather, they pluck out the poison-fangs, by pulling away the leather. They then in safety take off the skin, and broil the flesh.

Herodotus says, that the Troglodytes, a nation of Ethiopia, subsisted on snakes, lizards, and other reptiles.

The *Viper* or *Adder*, like the rattlesnake, is very tenacious of life. Boyle says the body of a viper will continue to twine and twist for some days after the skin, heart, head, and intestines are removed.[*] It has poison-fangs; but the poison does not often prove fatal to human beings. The flesh of the viper was once celebrated as a restorative, and was eaten in the solid state, or was taken as a broth. The latter was deemed worthy of a formula in the old pharmacopœias of the colleges of physicians. It is still used in Italy. Craterus, a physician of Rome, performed an extraordinary cure on a patient, who laboured under a wasting of the flesh, by feeding him with vipers dressed as fish. Avicenna gives a formula for preparing "troches of vipers." Pliny says, that there were some who used commonly to eat vipers to preserve their eye-sight: that others used them merely as food: they put salt in the vipers' mouth, as soon as killed, to destroy the poison; and, having cut away a portion near the head, they boiled the bodies with condiments, and served them to table. They are found, particularly in the chalky districts of England, of about two, or sometimes three, feet long.

[*] Works, by Shaw, i. 28

Although this serpent swallows very large animals, compared with its own diminutive size, it digests its food very slowly, and is said to live an almost incredibly long time without food: they have been known to bear an abstinence of more than two years.

Several other species of serpents are eaten in various parts of the world. The Birmans and Tonquinese eat them; and they are amongst the delicacies of the people of Aracan. Mr. Moore says, that the Mundingoes consider large snakes excellent food.*

The natives of King George's Sound during summer, set fire to the grass over a considerable extent, and search the ashes for the bodies of lizards and snakes which they devour in vast quantities. In the Andaman Isles, in the Gulf of Bengal, serpents are eaten abundantly. The wretched Bedouin Arabs eat them broiled on burning briars; and the natives of Asam are also partial to them. Mr. Bruce saw an Abyssinian eat a cerastes, an active and very poisonous serpent, about twelve or fourteen inches long. The poisonous nature of most of these serpents is no objection to their being used as food; for the poison is confined to certain receptacles attached to the fangs in the mouth; and if the head be cut off, or the fangs extracted, no other part is injurious.

This fact was well known to the poet Lucan. In the ninth book of Pharsália, he represents Cato addressing his soldiers, parched with thirst in the deserts of Lybia. They had arrived at a spring; but it was so infested with asps and vipers that the soldiers fled from it in affright. Cato, seeing them likely to perish from thirst, says,: —

Ne dubita miles tutos haurire liquores:
Noxia serpentum est admisto sanguine pestis:
Morsu virus habent, et fatum dente minantur,
Pocula morte carent. Dixit, dubiumque venenum
Hausit. —

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* Travels in Africa.

SECTION IV.

Class IV. *Pisces.*

WERE there no other source from which man could draw his supply of food than the waters of the earth, he would there find not only ample stores, but an almost endless variety. Amidst fourteen or fifteen hundred species of animals, the qualities of which differ essentially, the flesh of some having even the flavour of that of quadrupeds, he could not be much at a loss. Amongst the nations of antiquity, we find several who subsisted entirely on fish. The Icthyophagi were a people of Ethiopia, who were thus named from the great use they made of this kind of food. Herodotus tells us, that amongst the Babylonians there were tribes who lived entirely on it. It was their practice to dry the fish as soon as taken, to reduce it to powder when dry, and to sift it through a cloth. When this was to be used the powder was either kneaded into cakes, or baked into bread. He also speaks of some Egyptians who made use of no other food than fish, without any cookery beyond simple drying in the sun. The very constant use of fish as food by fishermen, would alone prove the salutary nature of this diet.

It is certain that however wholesome fish may be as diet there are numbers who have an insuperable objection to its use, owing to natural dislike, although there have been but a few examples of persons who had an analogous antipathy to the flesh of land animals. The celebrated Erasmus could not even endure the smell of fish, without being thrown into a state of agitation; a kind of constitutional peculiarity similar to that of the Duc d'Epernon, who was thrown into a convulsion at the sight of a leveret, and to that of others who are similarly affected by the presence of a cat. So high an opinion of fish as food had the ancient people of Rhodes, and to such an extravagant pitch did they carry this predilection, that, according to Ælian, they highly valued those who esteemed this diet, and equally despised those who preferred flesh-meat; but the Romans maintained just the contrary opinion. Certain tribes amongst the Hottentots have an utter detestation of fish; yet it is eaten by some Brahmins.

The consumption of fish as an article of subsistence is encouraged by all prudent governments, as not merely supplying a cheap, wholesome, and abundant food, but as affording sources of profitable employment in taking, curing, and vending it; and also in producing able-bodied and intrepid seamen. With such views the sagacious Elizabeth and her parliament ordered abstinence from flesh-meat on certain days of the week, not (as was declared) from any notion of serving the soul of man, but in order to promote the consumption of fish, and thus to multiply the number of fishermen and mariners, as well as to economise and increase the flesh-victual of the realm. The penalty for infringement of this act was *3l.*; but an exemption from its operation might be purchased for the sick at sums much under the penalty.

The parts of fishes are almost as extensively useful as the parts of land animals: the flesh is, no doubt, the chief object; but not the only one. Of the fins, skin and tail, a kind of fish-glue may be made. Of the roe is made caviar and botargo. The intestines are a delicate morsel to some nations who cannot afford to waste any part; nay, by many in our own country they are cooked into a favourite dish. The bones are powdered by the Laplanders, mixed with pine-bark, and made into bread. The fish retailers of Great Britain sell the skins of soles to the brewers, at the rate of *6d.* per pound, to be used along with, and often instead of, isinglass, for clearing their beer. Other fish skins constitute shagreen, polishing skin, &c. And our most delicate and ornamental *blanc-manger* is derived from the swimming bladder.

The intellect of this class of animals seems not of so low an order as persons sometimes suppose. Some fishes become acquainted with the person that feeds them, and will assemble at his call. A trout is mentioned which used to come to his master, and lie on his hand while the water of his prison was in the act of being changed. The ostracion cubicum is easily trained to feed at the hand. It is said that the sound of a bell attracts certain fishes; and it has been affirmed, as an undoubted fact, that they are allured by music. The moral addressed by Cyrus to the Ionian ambassadors, as related by Herodotus, shows that this opinion is of great antiquity. He told them, "that a piper wishing to allure the fish upon land, played for them, but in vain. He then caught them with a net, and, seeing them leaping in it, said, "You may cease to dance since you refused to come and do so when I piped."

The longevity of some fishes is sufficiently evinced by the following fact. — In 1754 a pike was taken at Kaiserslautun, which had a ring fastened to it, from which it appeared to have been put into the pond of that castle by order of Frederick II. in 1487, a period of 267 years. It was 19 feet long, and weighed 350 pounds. How much older it might have been than this, or how much longer it might have lived we have no means of judging.

The tenacity of life, and the conditions under which life is preserved, are various amongst fishes. The eel not only lives a long time out of water, but retains life after it is skinned; nay, when cut in pieces it still quivers, or when the backbone is altogether extracted. Large eels transported from Holland to London, are commonly thrown by the fishmongers into small leaden cisterns, supplied with a constant stream of fresh water from the street-mains; here they live for months in good condition, until required for use. In cisterns so small as two and a half feet cube, very large tench are kept alive for any length of time required. The carp may easily be transported from one pond to another without injury. It may be even wrapped up in moss, hung up, and if kept constantly wet, may be fed, and thus preserved for a fortnight.* Several flat-fish live many hours out of the water; soles, flounders, and turbot, are commonly seen in the fishmongers' shops flouncing off the tables. I have seen a turbot thirty-six hours out of water, which could not be kept on a table but for the cord which tied the tail and mouth together, so strong were its struggles. During Captain Franklin's voyage, it was found that on drawing fish out of the water by a net, the fish were immediately after frozen; yet while thus frozen, if laid before the fire they thawed and revived. Some fish sustain a temperature surprisingly high without injury. Busbequius mentions his having seen fishes in a spring at Buda, so hot, that he wondered they were not boiled. Dobrizhoffer describes a fountain in Paraguay, the water of which, although so hot as to be scarcely borne by human beings, nevertheless abounds in fishes.

The qualities of fish as food vary considerably. Sturgeon has scarcely any taste of fish, and closely resembles veal in look and taste. The whiting is so delicate, that the weakest stomachs digest it without difficulty. The eel is so rich and strong, although well tasted, that it disagrees with many. The pilchard is so abundant in oil, that even when much of it has been extracted by strong pressure, a sufficiency remains to render it luscious. Fish-diet occasionally produces eruptions of the skin: sometimes a single meal will produce an efflorescence of red patches over the whole body, accompanied by slight and transitory fever; the barbel, the plaise, the oyster, and several others have this effect occasionally. When out of season, fish is very apt to produce much disturbance of the constitution. Some species are even poisonous in their own nature, while others are occasionally rendered so by the food on which they subsist. Pliny mentions an island thrown up by the sea, in which was a kind of fish that poisoned those who ate of it. On the coast of Madagascar poisonous fish is found, which may be distinguished by the blackening of a piece of silver placed under the tongue. It is said, that the yellow-billed sprat of Barbadoes, kept in the mouth a few moments, and not swallowed, has produced death; and that it renders fish poisonous that feed on it.

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* Philosophical Transactions, 1771

Surgeon Anderson, of Captain Cook's ship *Resolution*, says, that they caught a fish off the island Malicolo, in the South Sea; which being dressed for dinner, five persons who ate of it were severely attacked with weakness, retching, griping, diarrhœa, flushing, and violent pains in the face and head, with giddiness, burning heat in the throat and mouth, and pains in the limbs; the pulse was slow; the fingers, legs, and toes, felt as if benumbed; and the limbs became temporarily paralytic. The patient sometimes imagined that his nose was grown to a great size. Salivation supervened, and they did not recover for ten or twelve days. Dogs which had eaten of the fish were affected in a manner somewhat analogous; and one died. A hog died in consequence of eating the offals.*

In the Philosophical Transactions (abridged by Shaw, &c. ii. 213) we find a short account of deleterious fish, of the Bahama Islands, causing severe pains of the joints. The distemper never proves mortal to man; but it kills dogs and cats. Men who have once had this disease, suffer an aggravated renewal of it on their next eating fish, even though it be of a wholesome kind. The first symptom of having eaten poisonous fish, is sometimes violent vomiting; the skin then separates on the hands and feet in patches, producing permanent discolouration of the spot. The best antidotes against fish-poison are Cayenne pepper, Madeira, and other powerful stimulants. In tropical and southern latitudes, ships' crews may often prevent ill consequences, by taking the intestines from the fish as soon as caught, and washing them well before they are dressed. On the shores of the island Diego Ruys, and in the island of Guam one of the Ladrones, the fish are frequently poisonous.

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* Philosophical Transactions, 1776.

Sometimes the same species taken in different parts of the same island is found to differ so much in condition that one will prove fatal, while the other is innoxious; at least Dr. Grainger stated this fact to Dr. Goldsmith. The galley-fish, if it may be considered a fish—a thin transparent bubble—is so virulent, that it not only proves a powerful poison when swallowed, but severely smarts the hand that touches it. The latter quality is also possessed by the back fin of the weever. The sea-orb is just as ugly in appearance, as its effects, when eaten, are deleterious. The liver of the grunting bull-head fish produces much disturbance of the constitution, if eaten. The American pilchard is occasionally unwholesome.

Mr. Smith states, that a variety of the surmullet is found to the south of New York, and sometimes at New York, which is possessed of poisonous qualities.* There are also some other fishes that prove poisonous.

Seneca says, that the fish of a river in Caria, near Locryma, although generally wholesome, were once rendered so poisonous, by some impregnation derived from the earth, that all who ate them died.

That the flavour of different fishes varies very much need scarcely to be observed upon further than that the difference is very great, and that the taste sometimes resembles that of food not derived from the sea. Thus the sucking fish is said to taste like a fried artichoke. There is a large fish known in China, and named "the fish in armour," which has a strong resemblance to veal in flavour. Our sturgeon is remarkable for the same quality; and the ormer, a shell-fish, has been compared to veal-cutlet.

Some fish are found constantly residing in salt water; some in fresh water: and some seem to live well in either. It is certain, that many of those which formerly were supposed to be peculiar to salt water, are now known to thrive in fresh water, provided they have been gradually assimilated to it, and that the proper food is procurable; the converse is also known to be true, and instances will be hereafter given.

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* Natural History of the Fishes of Massachusets, p 305

About eighty years since, a method was proposed by Mr. Tull, of improving the quality of fish by spaying. The best time for the operation is when the ova are in the ovaries. The fish, placed on its back, is to be so held by means of a wet cloth. The integuments of the abdomen are then to be opened with a sharp instrument, carefully avoiding the wounding of the intestines; the wound being held open, the intestines are to be removed a little to one side; the ovaries are seen, and these are to be divided by a sharp pair of scissars. The wound being sewed up with silk, the fish is to be replaced in the pond. Mr. Tull first put this method into practice, in order to prevent the excessive increase of fish in some of his ponds, where the numbers did not permit any of them to grow to an advantageous size. Not only was the increase thus prevented, but the fish grew larger and fatter than usual; and what is no trifling consideration, were always in season. Very few fish die of the operation, if it has been dexterously performed. In males, the seminal vessels were divided in the same manner, and with the same effects.* The same process has been employed upon other kinds of fish; the pike is said to be fattened by it, and improved in flavour.

The ingenuity of man has been successfully employed in devising methods of capturing fish. The baited hook has been known in all ages, and in all countries, even the most savage and uncultivated; a fact no doubt originating in the obviousness of the invention. The arts of the angler are more ingenious, more difficult to employ, and less successful, because practised on fishes that have more experience of man. The net is a clumsy device, devoid of all ingenuity, requiring nothing but labour; but the most certain and wholesale in its results. The taking of fish by intoxicating berries is an unsafe and dastardly method, requiring neither ingenuity, adroitness, courage, skill, nor any quality that is to be desired. Shooting fish, when they spring to overcome an obstacle, or in the water, requires more skill than it returns profit Spearing, gaffing, and harpooning, are amongst the most obvious methods, yet are often the most difficult to execute.

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* Philosophical Transactions, 1754.

The jesuit Le Compte describes two methods of fishing in China, which seem to imply more ingenuity than all the rest together. They train cormorants to dive for fish: one fisherman can look after one hundred birds. He keeps them perched on the sides of his boat, waiting patiently for his orders. On receiving the signal, each flies in the direction assigned him, dividing amongst them the whole breadth of the river. They dive; come up again; hover over the water till they perceive their prey; then dart on it; seize it; and bring it to their master. When the fish is too large, one takes it by the tail, the other by the head. The throats of the birds are tied with a cord to prevent their swallowing the small fish.

The other method is practised at night, by moonshine. They take two long straight boats, and nail on the sides, from one end to the other, a board about two feet broad, painted white, and finely varnished. This plank slopes outward, and almost touches the water. The reflexion of the moon increasing the brightness of the board, the fish spring up towards it, and either fall upon it or into the boat.

Light seems to act on the faculties of fish as well as of birds in some inexplicable way, both seem bewildered by it when shining at an unusual time, and are easily led to their destruction. The effect of the light of a torch burning on the banks of a river by night, is sometimes made use of by sportsmen to draw fishes within reach of a spear. Anchovies are attracted in the same manner; those who fish for them go out in boats, with a cage of burning charcoal fastened to each boat: the fish congregate to the spot, and are easily captured by a net. It is a remarkable fact, if true, as it is reported to be, that the anchovies taken in this manner are not so good, and do not keep as long as those that are caught by a different method.

Order I. Apodes.

The *Eel* is well known for its excellent flavour and the nutritiousness of its flesh: it is however difficult of digestion to some. The silver eel of the Thames is much esteemed for its delicacy: few of these however are procurable, Billingsgate being chiefly supplied from Holland. Dutch eels, when out of season, are strong and disagreeable; they are kept in quantity by the fishmongers, as stock, in large cisterns, through which there is a constant current of water from the street mains. In this state they will live, as I am informed, for months without any food, and will still remain in good condition. So tenacious of life is this fish, that, although when taken out of the cistern it gets a stunning blow on the head, it struggles violently while the skin is pulling off; and even when the backbone is taken out, with a view of collaring the eel, it still quivers throughout its length. Running a sharp-pointed wire down the spinal marrow kills them instantly. Those eels that weigh from three quarters of a pound to double that weight are preferred: they are in season almost the whole year round.

It is said that eels sometimes leave their ponds, and make their way through the grass to distant ones. It has even been affirmed, that they can ascend a perpendicular smooth board, five or six feet high, with as much seeming ease as if it had been level ground, their tenacious slime assisting them in the ascent.*

The eel was one of the most sacred fishes amongst the Egyptians; and Herodotus says, they considered it one of the holy personages of the Nile. In the present day, it is the subject of the most cruel tortures; but this has been already sufficiently alluded to. The first step in M. Ude's formula for an eel-matellotte is, "take one or two live eels, throw them in the fire."

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* Philosophical Transactions, 1747

The *Conger Eel* is sometimes of an immense size. A short time since one of these, caught in a shrimp-net, was brought to Lincoln by a fisherman of Boston: its length was six feet and a half, its girth thirty-two inches, and its weight eight stone. It was shown as a curiosity; but they have been sometimes found larger. The young conger is more delicate than the old one: a fish weighing twelve pounds is considered small: this fish, dried and powdered, is used for ragouts in Spain and Portugal. In Britain the conger is little valued.

The *Gymnotus*, or *electrical Eel*, like the torpedo, has the extraordinary power of calling electricity into a state of activity, and using it both as a means of defence, and of overpowering its prey. It is not very unlike the common eel, except that it is much larger: some of them are between five and six feet long. A fish four feet long will weigh twelve pounds. The gymnotus may be considered as an animated galvanic pile, consisting of membranous plates, and capable of giving powerful shocks, even at a distance. The shock is absolutely tremendous: M. Humboldt, by placing both his feet on a vigorous gymnotus, received a dreadful shock, as great as any he had ever experienced from the discharge of an electrical machine. He was affected during the rest of the day with a violent pain in the knees, and in almost every joint. Nay, it has been affirmed, that this shock is capable of inducing paralysis: mules have often been killed by it, in fording a river in which they were. The power of the fish is exhausted by frequent infliction of the shock in quick succession, and then it requires time to recover itself; it is during this interval that it may be safely captured. Sparks may even be obtained from the fish by peculiar management.

M. Humboldt has described a singular mode of fishing for those animals, adopted by the Indians of South America, which he witnessed. About thirty wild horses and mules were forced into the pool, which speedily roused the gymnoti from the mud to the surface. The eels commenced an attack upon the horses; and by communicating repeated electrical shocks, actually overpowered some of them. several sunk beneath the violence of these invisible strokes, and disappeared under the water. In less than five minutes, two horses were drowned. The eels having at length exhausted their energy, retired to the edge of the marsh, and were captured.

This extraordinary creature, notwithstanding its terrific powers, is used as food. The electric organs fill the greater part of the body, they are slimy and disagreeable to the taste, and are, therefore, carefully separated: but the rest of the body furnishes pretty good food.

When a small fish is thrown into a vessel of water containing one of these electrical eels, the eel first gives it a shock which kills, or so stupifies it that it may be swallowed without trouble. If the fish, after receiving the shock, be removed into another vessel of water, it recovers. When a fish is thrown in so large that the eel cannot swallow it, the fish receives several shocks until it is apparently killed, and then the eel attempts to suck it in, but failing, abandons it.*

The *Wolf-fish*, or *Sea-wolf*, is an ugly and ferocious creature, with teeth so hard, and muscles acting on the jaws so powerful, that it not only easily breaks shell-fish, which is its food, but is said to leave an impression on iron. Notwithstanding its forbidding aspect, it is used as food, and is by no means despicable. It is sometimes taken near the coasts of Britain; but more northward it is abundant.

The *Sword-fish*. This fish takes its name from the projection of its nose into a long sharp bony substance which is capable of piercing the side of a ship to such a depth that the piece remains fast, the force having been sufficient to break it. The fish often measures twenty-four feet in length, of which the sword occupies a fifth or sixth. With this terrific weapon it attacks the whale, of which it is the determined enemy, and generally comes off the victor. It is an inhabitant of the Mediterranean sea, and is a favourite food with the people of those countries, the shores of which are washed by it. It is abundant in the Atlantic Ocean also.

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* Philosophical Transactions, 1775.

Order II. JUGULARES.

The *Cod*, one of the most numerous of all fish, and not inferior to many, is a frequenter of the shores of England, Ireland, and Scotland, as well as of all other countries washed by the northern seas. The fisheries of Nova Scotia and of Newfoundland are of immense value, although the latter place is less productive than formerly. The cod is sometimes a very large fish. one taken on the coast of Scarborough weighed seventy-eight pounds, and was five feet eight inches long; but the common size in the markets is about thirty inches in length. In ten scores (200), perhaps twenty of them will weigh twenty-five to thirty pounds each: those of a moderate size are preferred; and the flesh of one weighing twelve pounds is as well tasted as that of one weighing double as much. A short thick body with a small head is the best, and it ought to be firm to the touch: those which have a black skin are generally selected. A good cod will sometimes bring so high a price at Billingsgate as a guinea, when the supply is small. A dull eye is generally understood to be the characteristic of a stale cod-fish; but it is a criterion which ought not to be implicitly relied on; for if the stroke alluded to at p. 5. be given too far back on the head, it produces premature dulness of that organ.

The cod is in perfection a month before Christmas, and remains so for about two months; but until Easter it is good, and is not bad even for a month later. In spring, after the female has spawned, the flesh is soft and insipid.

The cod of the Canary islands is said by some to be preferable to that of Newfoundland; but the best that comes to Billingsgate is caught off the Dogger-bank.

This fish is thought by many to be improved by being salted for twenty-four hours previously to its appearance at table. It certainly becomes firmer; but it is a question which every one will solve as he pleases, is not the pure fine flavour more or less impaired? In three days the salt produces an evident deterioration; and that which has been regularly salted and dried retains very little of the characters and perfections of this favourite fish. In short there can scarcely be two things more unlike than a fresh and a dried cod, so much inferior is the latter.

A train oil is obtained from the livers by allowing a quantity of them to run into putrefaction, for during this change the oil gradually oozes out; or by simple heat and pressure, a method which affords a nicer oil. Instead of being applied to this use, the liver is eaten by many persons and much relished.

The swimming bladder or *sound*, after being cleaned, salted, and dried, is packed in barrels. It is a kind of food much relished, being gelatinous and nourishing, of a less fishy taste than any other part, and less altered in its qualities by salting. Sometimes the sound is converted into a kind of isinglass, which is said to be excellent. The tongues are similarly treated; they are also gelatinous and delicate except the roots which are coarse and fishy.

The head is perhaps the most delicate and nutritious part of the whole fish. Unfortunately it cannot be preserved by salting: and hence, when the cod is caught, the fishermen cut off the head, and throw it overboard, the tongue having been saved for salting, and the gills for bait. Thus of the millions taken for drying, the best part actually goes to waste. The intestines also afford a dish which, when rightly prepared, is a favourite with many. Mr. Smith prefers the caviar prepared from the roe of the cod to that obtained from the sturgeon.[*]

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[*] History of Fishes of Massachusets

The cod is very prolific: according to Lewenhoek one fish contains upwards of 9,000,000 eggs.

The *Haddock* is remarkable for the two dark-coloured streaks, descending transversely from the shoulders, and perpetuated on the species, according to a vulgar superstition, by the fingers of St Peter when he took it from the sea to obtain the tribute money contained in its mouth: this mark easily distinguishes it from the codlin.

A haddock under two pounds weight is seldom a well-tasted fish: but at this weight it is as good as when it weighs five. Occasionally they are taken as large as an ordinary cod; and in this case they are less prized, being dry and disagreeable. They are in season from June to September only, if full grown; but the small ones are tolerably good whenever they can be had. So punctual are the shoals of haddocks in their arrivals at such places as they periodically visit, that the great shoal which annually visited the coast of Yorkshire arrived there in 1766 on the 10th of December, and reappeared precisely on the same day and month in the following year. But they are liable to destructive casualties in their peregrinations, for in 1789 the shoals suddenly diminished in numbers to such an extent that not one ten-thousandth part of the usual number of fish was taken. The shoal had hitherto occupied an area about three miles in breadth and forty in length. This disappearance received a curious explanation a few years afterwards. A ship on its way to Archangel, while in latitude 68, fell in during three days with immense quantities of haddocks lying dead or dying on the surface of the ocean. In some places they were in such numbers that, in the compass of twelve or fifteen yards, from three to five tons might have been taken up. Some of them were eaten, and found harmless. This occurred in 1789, five months before they should have appeared on the coast of Yorkshire. The phenomenon has never received a satisfactory explanation. Some have attributed such mortalities to the effects of lightning.

The haddock is often salted and dried, but suffers materially in the quality of the fish: even the celebrated Finnan haddock is by many considered very bad fare; and concerning what is commonly sold in London under that name there can scarcely be a second opinion.

The *Whiting* is probably the most delicate of all the salt-water fish, and is therefore much used by the valetudinarian. Beside delicacy, it possesses purity of flavour devoid of all peculiarity, and is therefore a favourite with all who are admirers of fish. These qualities belong to whitings of all sizes, but the largest are the best. The weight of those that come to Billingsgate varies from half a pound to three pounds. They are common in the Northern seas; and frequent some part or other of the shores of Great Britain almost all the year round, but chiefly in the Spring. They are best in summer; and are then brought to Gravesend in well boats. In winter they are sent to London in baskets, from several parts of the coast: in summer they would not keep in baskets. The largest are caught off the Dogger-bank. The body of a good whiting is firm; its silvery sides are brilliant, and its fins strong.

The *Whiting-pollack* is not very much prized; it is common near the shores of Britain, and in the Baltic. It is generally about the size of a haddock. Its flesh is rather coarse.

The *Hake* is abundant in various parts of the coasts of Great Britain, but particularly in the Bay of Galway. It is not a favourite in general, but its quality seems to vary with the place; for in some parts of the South of Ireland it is an excellent fish, while in the North it is coarse and tasteless, and procurable at the cost of a few pence. When salted and dried it is sometimes called stock-fish. It is common in the Mediterranean and North seas.

The *Ling* is longer and more slender than the cod, which in the dried state is often substituted for it, and fraudulently, for ling-fish is vastly superior. It is common in the North sea, and the Baltic. It is taken in great quantities near the coasts of England, Ireland, and Scotland. The Orkney and Shetland islands produce it abundantly. In London this fish, whether dried or salted, seems to be little valued, and little used.

The *Torsk* is not so slender as the ling, and is altogether a smaller fish. As food it is considered more delicate than ling. It frequents the same shores and is an article of export in the salted and dried state.

Order III. Thoracici.

The *John Doree* if a corruption of *jaune dorée* or golden yellow is certainly a misnomer, for this fish is of a disagreeable dirty yellowish white scattered with light brownish stains. It is an ugly creature; the head is so large that it occupies one-third of the whole body, leaving, on account of the fins and tail, but a comparatively small portion of edible parts. It has a very large mouth, a large eye, placed very far back in its head, and a most stupid expression of countenance, if it may be so expressed. It is a flat fish, longer and thicker in proportion to its breadth than the turbit or plaise, but unlike these fishes it has its two eyes on different sides of its head. In fine it is an ugly, stupid, rugged, unusual-looking fish, which were it to be judged by its appearance would be banished from every table. Yet so far is this from being the case, that it is not only a delicacy but an expensive one: for a doree weighing ten or twelve pounds will frequently cost twenty shillings, and sometimes more. It comes into season about the end of Spring. It was not admitted to English feasts until brought into notice by the eccentric comedian Quin, who invented for it a peculiar sauce, and restored it to the high rank in our list of eatables that it anciently held amongst the Romans. The coast of Devonshire is celebrated for producing this fish in great perfection: it has dark spots on its sides like the haddock, and hence it has been by some maintained to be the fish which presented the coin to St. Peter. A doree weighing ten pounds is accounted a large one. The flesh is solid and firm, although when fully boiled it cuts somewhat transparent like a half boiled cod. It is an inhabitant of the Mediterranean sea, and of the Atlantic ocean.[*]

The *Holibut*, or *Halibut*, is the largest of the flat fish. In the Island of Kodiak, a Prussian settlement in the Northern Pacific Ocean, it has been taken of the enormous weight of 600 pounds:[*] in the London market it varies from six pounds to 170. The flesh is rather dry and insipid, although small ones are sometimes sold as turbot. Its body is longer in proportion to the breadth than that of the turbot. Captain Cook's men, in three hours fishing, took 100 of these fishes, some of which weighed 100 pounds. Broiled in slices it is superior to the boiled fish. The head is a favourite part with many, and so much as 10*s* is occasionally paid for it: sometimes a holibut weighing thirty pounds will cost as many shillings, although at other times it may be bought for one-third of that sum. The fishmongers often sell it in slices, at 6*d*. per pound.

The *Plaise*, a favourite fish, requires neither description nor commendation: it is occasionally as large as some turbots, but may be at once distinguished by the orange-red spots with which the back is sprinkled. It has scarcely any scales. The Dutch plaise comes to Billingsgate Market during the winter season; and when they begin to go out, the English plaice, from the straits of Dover, and the English Channel, round the south of England, come in.

The *Sole* is by some preferred to the turbot. It sometimes reaches the weight of seven pounds, but those of one-third of that weight are preferred. They are taken on the coast of England, of an excellent quality: those from the straits of Dover are considered the best that come to the London market; and they are in season almost the whole year, but best about Midsummer. The Yarmouth soles are inferior, owing perhaps to a bad bottom for feeding. The Dutch soles are good in winter, but are out of season in April. They live several hours after being taken from the water. A good sole is known by its under parts being cream-coloured, and its body thick and firm.

The *Turbot*, the prince of all flat fish, although rich and nutritious has peculiar delicacy. When in good season its under parts are cream-coloured, and it is firm and substantial: in its pure fishy taste may be discovered a little of the lobster-claw flavour. The larger it is the more it possesses these qualities, within certain limits: a gigantic one is always tough and thready. (*Ude.*) It is found in the markets so large as twenty pounds occasionally; but one of half that weight is a much more saleable article. It is distinguished from the brill by the following marks: the brill is longer and narrower than the turbot: the brill has scales on both sides, the turbot has thorns on the back and no scales on the other side. The turbot is distinguished from plaice by the absence of red spots on the former. Dover turbot is the best, Dutch is next, and Scotch is the least approved. The most saleable size is from nine to twelve pounds weight. The turbot is very tenacious of life; it sometimes leaps after being many hours out of water. I find by accurate trial, that of a turbot weighing nine pounds, the skeleton weighs twenty ounces avoirdupois. M. Ude says, that a turbot kept three days is much better than a fresh one. The emperor Domitian once called upon the senate to determine the important question, in what vessel a turbot could best be cooked: and although this was done in ridicule of the senate, it shows that this fish was then, as now, a prime favourite.

The *Brill* has very much the same shape as the turbot, but is longer in proportion to its breadth. It has scales on both sides. A large fish will weigh twelve pounds; but one of four or five pounds is a saleable size. It is inferior to the turbot in flavour, although sometimes fraudulently substituted for it: it is, however, an excellent fish.

The *Flounder* is an exceedingly nice fish, although sold at a very low price. It is remarkably tenacious of life, and in cold weather will often live two or three days after it leaves the water. Nothing is more common than to see them on the tables of the fishmongers struggling vivaciously. They are in season in the winter and summer quarters of the year. It is a fish that does not bear keeping without great injury to the purity of its flavour and its firmness. They are fond of living at the mouths of rivers, and ascend even to those parts which are no longer brackish. Occasionally they attain a considerable size, as five or six pounds; but they occur very small in the London market, yet of an excellent flavour, and are by many preferred to the plaice.

The *Perch* is a well-known ornament of our ponds, valued indeed more for its colours than its shape, its breadth or depth compared with its length being inordinate. It sometimes grows to the weight of eight or nine pounds, but generally it does not exceed a pound and a half or two pounds. It is esteemed an excellent fish, being firm, white, delicate, and well tasted. It remains alive a long time out of water, and may safely be transported from one pond to another. The perch and trout are considered the best fresh-water fish: but the perch is not common in the London market, it being an inhabitant of private ponds and rivulets. It is taken of a good quality in the Thames; and is in season during the winter quarter.

The *Mackerel* is a handsome fish, not less pleasing in its form than in the variety and beauty of its colours. The sides are iridescent like mother-of-pearl, but more silvery: the jaws have almost a metallic splendour: the back is of a beautiful greyish blue: the top of the head is of the same hue, but more brilliant. The back is traversed by black, slanting, waving lines: the teeth are exceedingly small, numerous, and tenacious: the gills are of a very deep red. About the middle of May a mackerel, sixteen and a half inches long from the nose to the extremity of the tail, will be in greatest circumference equal to half its length, and will weigh twenty-five ounces, of which the roe will constitute one-tenth.

There are several species, and most of them are used as food. To be in perfection for the table mackerel should be quite fresh from the water, and in that state it stands second to few fishes; and few suffer so detrimental and speedy a change from being kept; for even on the second day it is almost unfit for use in summer. It dies instantly on leaving the water.

It is exceedingly voracious, and makes vast havoc amongst the herrings: nay, it is said to attack human beings, and to be difficultly beaten off. It has a particular attachment to a red colour, and will snap at even a bit of red cloth, and may thus be caught.

These fishes are taken in the British and Irish seas: they are abundant on the coasts of Essex, Suffolk, and Norfolk, where they arrive about April or May. They are best in May, but are in season nearly until Autumn.

On their first arrival at these shores they are nearly blind, owing to a film on their eyes. They are not abundant in Scotland.

It is generally considered that broiling is a better mode of cookery for mackerel than boiling. Pickled mackerel is the preserved form in which it is most esteemed, but it makes a good dry salt-fish.

The *Tunny*, or *Spanish Mackerel*, is a very large fish, sometimes reaching ten feet in length. It is abundant in the Mediterranean; and being universally esteemed for the excellence of its flavour and nutritiveness, fisheries are established in many places on the shores of this sea. Of such consequence is the fishery at Cadiz, that a tunny fish is the emblem adopted on the current coin. Fisheries are also established on the coast of Sicily; and on both sides of the Adriatic sea. In Croatia this fish is one of the chief sources of wealth. The flesh of the unboiled tunny when fresh is the colour of beef; but by boiling it becomes paler. It is eaten fresh and salt: vast quantities of it are exported in the salted state. Its taste resembles that of salmon. It was much esteemed by the Romans.

The *Red Surmullet* of the ancients was a very different fish from the grey and red mullet of the moderns: it was known by the name of mullus by the Romans, and was the fish which it was the fashion to bring alive in vases to the tables of the Roman epicures, in order that, previously to being feasted with its flesh, they might be gratified with the sight of its expiring struggles, and changes of colour. For the scales being bright and transparent, they allow the colour of the skin, naturally red, but varying during the approach of death, to be clearly seen. As food it was accounted delicious; and amongst its eulogists we find the names of Galen, Martial, Horace, and Juvenal. The liver was esteemed a prime delicacy, and Apicius invented a soup made from it. As one fish is known to have cost from £40. to £80. the species must have been at that time very rare. In the present day no such inordinate value is set on them, and they are taken on the coasts of France, Spain, and Portugal. I believe they never frequent the shores of Creat Britain.

The *Gurnard,* a fish of by no means a prepossessing aspect notwithstanding the brilliancy of its hues, is considered by many persons as a fourth-rate fish; it seems however to become more generally a favourite than formerly. In some species, the fins are so broad and powerful that the fish is enabled to make considerable springs through the air. It is in season from October throughout the winter. It commonly weighs two or three pounds, but occasionally they occur so large as ten pounds. The flesh is white and firm: the head, which bears a great proportion to the bulk of the whole body, is entirely bone. The piper gurnard, like the loche, when taken from the water emits a singular sound: it is caught on some parts of the British coast.

Order IV. ABDOMINALES.

The *Salmon* is perhaps the most graceful in form of all fishes; and as to the qualities of its flesh no testimony in its favour need here be given: it is rich, and even oily; yet both qualities are combined with a delicacy peculiarly its own. It is in season during April, May, June, July, and August. Occasionally it is a very large fish; those that are generally taken in the rivers of Great Britain vary from about four pounds to seventy. When in season the small fish is as good in quality as the large: perhaps a twelve pound salmon is the best. It thrives either in salt or fresh water; but about September in each year they forsake the sea and enter the rivers to spawn. In their progress they surmount all obstacles, and with an elastic spring will leap over heights, dams, and barriers of ten times their own length. They spawn in shallow water: for several weeks after this their appearance is totally altered, and their flesh is unfit for the table. About the beginning of April the fry are three inches long, in two months more measure a foot; and in August they often weigh six pounds, and are fit for the table, although much inferior to the full-grown salmon taken in May.

Immense quantities of salmon are sent from Scotland to London in the fresh state, packed in ice; the ice is sold to the confectioners. They abound in the northern seas and rivers, but are said to be less abundant in the rivers of England than formerly. The Caspian sea produces them in great numbers, but not the Mediterranean. The American salmon is generally smaller than the European. London receives considerable quantities of salted salmon from Scotland: but the fine and peculiar flavour of the fish is almost destroyed by the salt, and it becomes very little superior to the commonest kinds of dried fish. A good deal of fresh salmon of excellent quality is exported from Ireland, which in London is highly esteemed. The Severn salmon is sent to London crimped; it sometimes sells at 2*s* 6*d*. the pound when other salmon is selling at 1*s*. Thames salmon is rare: it sometimes sells for 6*s*. per pound. M Ude assures us that he has occasionally paid 16*s*. per pound for Thames salmon. when procurable it is considered the best.

The *Salmon-trout* has been often supposed to be merely the salmon in progress towards maturity; but this notion is pretty generally abandoned, and the salmon-trout is admitted as a distinct species although very much resembling the salmon. As food, however, it is in every respect inferior: its flesh is sometimes white, sometimes red. When large, as ten or twelve pounds weight, it is white, and is little valued: but when small, as four pounds and under, it is generally red, but not always: it is never so red as salmon. By examining the inside of the throat through the gills the colour of the throat will be seen: if very red, the flesh will prove red; and this is the kind that is prized. It is in season during October and November.

The *Trout*, the rival of the salmon in symmetry and the beauty of its tints, is not less so in estimation as food. There are many varieties in the British isles; some when fully grown do not exceed half a pound weight, but others attain the weight of ten pounds. Very small trout are insipid, and are little valued. The best kinds of trout are observed to become less numerous than formerly in the British isles. They spawn about the same season as salmon, and for some time after are dry and comparatively tasteless as food. They are in season from March to September: but are best in May and June. The female is known by its smaller head and deeper body, and is always preferred for delicacy.

In Canada there are trout of a gigantic size, some of them measuring five feet in length: yet their flavour is very delicate. In Lake Superior (Canada) trout of fifty pounds weight have been taken.* In Ireland the gillaroo trout is in high estimation: these often weigh seven pounds, and are remarkable for a large thick muscular stomach resembling the gizzard of a fowl, and from this circumstance they have been called gizzard-trout. They live chiefly on shell-fish and snails, but readily rise at a fly.† They are more common in Lough Corryb and the lakes of Galway than the other waters of Ireland; but they are also caught in Lough Denn, through which the Shannon runs.‡

The Suen-trout of Caermarthenshire are also much in repute as delicious and nutritive food. On a late occasion two trouts were taken in a mill-tail in Berkshire, one of which weighed nine pounds and the other seven.

The flesh of the river trout is sometimes red, sometimes white: it is more generally red, not near so much so as salmon. They are not very common in London; and when of the weight of two pounds cost *3s.* to *4s.* A one pound trout costs from *1s. 6d.* to *2s.*

The *Smelt* or *Spirling* is remarkable for two qualities, the transparency of its body, and its odoriferous smell. The transparency is such that the circulation of the blood may be discovered by the aid of a microscope, and the brain can be seen through the skull. The odour has been compared to that of violets, and by some to that of a cucumber: perhaps the name *smelt* is derived from the circumstance. The perfection of the odour indicates the freshness of the fish. It sometimes attains a foot in length, but is generally much smaller, weighing about half a pound: they are in season all times except summer. Those taken in the Thames are most esteemed. Large ones come from Carlisle, but they are dry compared with those taken about Rochester. The fish loses its odour by being boiled, and when raw by becoming stale. It is considered a delicacy, and is generally sent to table fried.

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* Mackenzie's Journal

† Davy's Salmonia.

‡ Hon. Daines Barrington

The smelt is a sea-water fish and comes up our rivers only for a short time, and then only as far as the water continues brackish. The Honourable Daines Barrington informs us, that in a large pool not far from Boston, which had not the least communication with the sea, several smelts, originally introduced from the salt-water, had lived many years, and were to all appearance very healthy.* The rearing of salt-water fish in ponds is an important pursuit, and has not been sufficiently cultivated.

The *Pike*, from his voracity, has been justly called the fresh-water shark. Courageous and strong, he attacks and devours all smaller fish, and sometimes falls a victim to his conquest by his inability to swallow the fish that is half engulphed in his capacious throat. Even when captured by the angler he will when brought to land bite with great severity: he even bites the legs of persons who go into the water where he is. The pike combats with the otter for the fish which he holds in his mouth: serpents, bats, frogs, rats, and young ducks are welcome food to this voracious creature. We have accounts of a pike that swallowed the head of a swan while feeding under water, and not being able to disgorge, both lost their lives: and of another that fastened on the nose of a mule, and sooner than let go allowed itself to be drawn on land.

Occasionally the pike is found of a very large size. Some time since one of them was taken out of the pond of Castle Ashby, which weighed thirty-four pounds. It was sent by the Marquis of Northampton as a present to his Majesty. At least they live long enough to permit an ample growth; for, as has been already stated page 166, a pike has been taken which there was reason to believe was of the mature age of 267 years; it was nineteen feet long, and weighed 350 pounds. They spawn about the end of March, and are so prolific that in one roe 148,000 ova have been seen. The roe is made into a caviare, and the fish salted and dried in some countries. The pike is still considered a good fish for the table; but there was a time when one fish was equal in value to two house-lambs.

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* Philosophical Transactions.

The pike is easily captured by the artifices of the angler; he snaps at a gaudy fly; but more readily takes a hook baited with a frog or a mouse, whether real or artificial. Fond of glittering things, he has been known to swallow a gold watch and trinkets. It is rather a handsome fish, its colours being bright and showy, and this is the best test of its being fresh and in good condition. It is supposed to derive its name from the sharpness of its snout. Those caught in rivers are preferred to those taken in ponds; but it is always dry and is never valued but where fish is scarce.

The pike is known to seize and devour the musk-rat* in waters which the latter animals frequent, the consequence of which is that the pike acquires a strong musky flavour, and becomes uneatable.

In the London market the pike is little esteemed: the best season for it is from autumn to the end of winter. Those that weigh five or six pounds are considered to be the best fish; but they often are offered for sale of the weight of eighteen pounds, although when so large it is particularly coarse and dry. A nice size may generally be purchased in London for about *3s.* A small pike is called a *jack.*

Sea pike. It is an opinion amongst the fishermen that the shoals of mackerel arrive on the shores of this country under escort of another kind of fish called the sea-pike, a most singular looking creature. This is sometimes brought to market; and it is curious that its flavour very much resembles that of the mackerel, but in my opinion is superior. Its elongated, slender, and pointed head more resembles the long bill of a snipe than the head of a fish. When the fish measures twenty-one inches from snout to tail the head and bill together measure six inches, and the bill three inches and a-half in length: this bill or head is very slender, the upper jaw as it may be called being somewhat horny: both jaws are thickly planted with minute teeth as sharp as needles. This bill or beak is supposed to be its weapon of protection to the mackerel, but is too soft to act as such. In its general appearance this fish is like an eel, but is not so round, its sides being somewhat flatted. The colour is a handsome bluish grey on the back, with splendid silvery sides. When the length is twenty-one inches, the greatest girth is four, and its weight five ounces and a half: its eye is large for the size of the fish. A singular property of the back-bone is, that when boiled the colour becomes green.

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* Castor moschatus. Lin.

The *Mullet*. Of this fish two kinds only come into London, the grey and the red, although there are several others.

The grey mullet is of an undecided brownish-blue colour on the back, with bluish-green tints in certain lights, traversed by several straight longitudinal dark stripes; the under parts are silvery. They commonly occur in the London market, weighing from one pound to five; but they sometimes reach twelve pounds. This fish is very common in the Black Sea and Mediterranean, but frequents some parts of the coasts of England, and enters the mouths of rivers. The Honourable Daines Barrington informs us, that it may be naturalised to live entirely in fresh water. In a canal in Wales, where sea-water was originally let in, some grey mullets entered, and continued to live, although the intermixture of fresh water constantly increased until at length the canal was entirely filled with fresh water. Two years after this event, that is four years from the period of the exclusion of the sea, the fish were alive, and perhaps they lived long after, but they did not appear to be in as good condition as when fresh from the sea.*

When the grey mullets have entered our rivers they become the sport of the angler, for they readily rise to the artificial fly. The shoals are often so considerable that they change the apparent colour of the water; they are then taken in a net, but often elude the fisherman by leaping over it; and if this exploit be successfully performed by one, all the rest follow. Those taken in the river Arun, in Sussex, are greatly esteemed for the delicacy of their flavour, owing as is thought to their feeding on a water plant which grows there abundantly. With the exception of the mullets of this river, those taken in the sea are generally preferred. Dr. Shaw says, that the lake of Tunis is remarkable for the largeness and sweetness of its mullets. The roe of this fish pressed and dried constitutes a favourite article of food, called *botargo*: it is accounted a great dainty in France and Italy. In some places the practice is to smoke the roes that are intended for making botargo. Some authors say that botargo is the roe of the red mullet; and some confusion seems to prevail on this and other facts relative to the two species.

The red mullet is a very different fish in appearance and in estimation as food. A grey mullet weighing one pound and a-half may be bought in London for 1*s.*, and rarely exceeds 1*s.* 6*d.*; but a red mullet weighing one pound will sometimes cost 6*s.*, while a half-pound fish, which is the more usual size, may be purchased at 1*s.*, and sometimes for 6*d.* or less. The red mullet inhabits the Mediterranean seas; but is found on some parts of the shores of England: about Hastings it is taken with the mackerel, but it is also caught on the coast of Cornwall.

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* Philosophical Transactions, 1771.

It is a striking and handsome fish; its colour being silvery white, covered on the back with large brilliant red spots, intermixed with a similar hue of less intensity. In a day or two after it is taken from the water its splendid colours begin to decay, and on this account those that look pale and withered are to be avoided if brighter ones are procurable.

Both kinds of mullet are in season in Spring and the beginning of Summer. The red, when in best season and newly taken, is considered a great delicacy.

The *Herring*—one of the most useful and, in its habitudes singular fishes of all those that contribute to the welfare of man,—is well known to every one. Its migrations have been a subject of interest and inquiry to many naturalists, but the object of them is still involved in doubt, some supposing that it is for the purpose of spawning, and others that they are urged by necessity to search after food. Be this as it may the great colony leaves the icy sea about the middle of winter composed of such numbers, as a popular writer, using an excusable hyperbole, that if all the men in the world were to be loaded with them they would not carry the thousandth part away. They no sooner leave their retreats than millions of enemies appear to thin their squadrons. The fin-fish and the cachalot swallow barrels at a yawn: the porpus, the grampus, the shark, and the dog-fish, find them an easy prey, and desist from making war on each other: but still more, the numberless flocks of polar sea-fowl spread extensive ruin amongst them. The defenceless emigrants separate into shoals, one of which pours down along the coasts of America: another towards Europe, and reaches the shores of Iceland about the beginning of March. Here the water seems alive, and is seen black with them to a great distance. They are here cooped up so closely by the porpus, the shark, and the birds, that a shovel put into the water might take them up without further trouble.

That body which comes upon our coasts begins to appear off the Shetland isles in April. These are the forerunners of the grand shoal which descends in June, and of which the arrival is announced by the number of its greedy attendants, the gannet, the gull, the shark, and the porpus. When the main body has arrived, its breadth and depth is such as to alter the very appearance of the ocean; the water before them curls up, as if forced out of its bed, they sink and rise, and reflect a variety of splendid colours. The fishermen are prepared for their reception, and in their nets sometimes take 2000 barrels at a single draught. From the Shetland isles another body goes off to the western coasts of Ireland, where they again divide into two portions, one takes to the Atlantic the other to the Irish sea. Anderson, from whom this account is taken, doubts whether any of them ever return to their original quarters.

The herring when perfectly fresh, a point easily ascertained by the brightness of its colours, and in good season is an excellent fish. But it dies immediately on leaving the water, and speedily suffers a commencement of putrefaction, and even the least degree of staleness totally destroys its recommendatory qualities. It is in perfection when full of roe: they are in this state during the summer quarter; but during winter they deposit their spawn, and having done so they become soft, poor, and tasteless.

In some seasons and places, as the western coast of Scotland, the herrings have been taken in such enormous quantities that, after disposing of all that was possible in their recent state, salting as much as the curers found it practicable to accomplish, and extracting vast quantities of oil from others, the remainder was obliged to be used as manure. The same occasionally happens with the pilchards of the coast of Cornwall.

White herrings are cured by immediately removing the viscera when they are caught, steeping them in brine for a day, draining, and stratifying them with salt in barrels. Red herrings are cured in the first instance by cleansing, and salting: they are then hung up in sheds, and dried for a month in the smoke of burning wood. The Yarmouth bloaters are thus cured. It is said that the herrings taken on the coast of New Brunswick, are fitter than any other for preservation, and bear a warm climate better: their flesh is remarkable for firmness.

The *Pilchard* very much resembles the herring; but it is thicker when the length is the same; and its scales are larger and adhere more firmly. It is a somewhat smaller fish than the herring, and unlike the latter, either has no teeth, or they are very difficultly discoverable. The coast of Cornwall is their chief resort in England; but they are also found on the coast of Devon. At the former place 1200 hogsheads, amounting to 3,000 millions of fish, have been taken at one draught of the net: and such has often been the total quantity taken in one season, that beside supplying all demands for the home consumption, fresh and salt, and for the export of the latter, and extracting as much oil as consumption could be obtained for, a vast quantity still remained, which for want of other use was employed as manure on the ground. They arrive in July, and remain until October; formerly they remained until Christmas (*Forbes.*) Some time after their appearance on the coast of England they visit France and Spain. In Lisbon they constitute a chief article of subsistence. When the shoals arrive the sea appears of a purple hue by day, and is luminous at night, owing to the phosphorescent light so copiously emitted by these myriads. Their visits, like those of the herrings, are somewhat capricious as to period, duration, and place: and this important fishery, which has given profitable and diversified employment to the numerous and industrious population of Cornwall, and established there a nursery of intrepid seamen, is likely to suffer from the unaccountable preference which these creatures manifest towards changes of locality. Indeed the fishing is already a less profitable concern than formerly.

The taste of the pilchard very much resembles that of the herring, but it is more oily: and even after much of its oil has been removed by pressure, it is still as rich as could be wished. It is little sought after in London. Its oil is obtained either by pressure or boiling: it is of a bad quality, and fitted for very few purposes, notwithstanding the many efforts that have been made to improve it and render it available.

So valuable is this fish as a manure that a single fish is said to fertilise a square foot of land for several years, a statement which seems a little exaggerated.

The *Sprat* very much resembles the herring, except in size, it seldom exceeding five or six inches in length. They are taken in myriads in the Thames, where they appear during the whole winter quarter, and afford a wholesome and exceedingly palatable food, at a very low price. They are also salted, dried, and smoked, and in this state are sometimes admitted to the breakfast table of those who disregard their rather strong odour. They are occasionally pickled in the manner of anchovies, and sold as such; but they are inferior in all respects, although having a certain resemblance in taste. Like the pilchard, they are often used as a manure after the demand for all other purposes has been supplied.

The *Anchovy* has maintained its place in public estimation at least since the days of the ancient Greeks and Romans, whose predilection was so strong that a kind of anchovy sauce, called *garum*, entered into the composition of many of their dishes. They made a garum however from several other kinds of fish.

The anchovy was enumerated amongst the herrings by Linnæus, but it has been lately separated from them. Its body is somewhat transparent: it is about four or five inches long, slender, bluish green on the back, silvery on the sides. It approaches the shores for the purpose of spawning, and is always a welcome visitor. It is in greatest perfection in May, June, and July, and is always then taken. Its bones are almost perfectly soluble in water by boiling, and this property renders it more fit for making sauces than the sprat and sardine, which are sometimes substituted for it, and distinguishes it from them. Sometimes, however, the sardine sells at a higher price than the anchovy. The latter inhabits the Mediterranean, but is chiefly taken at the island of Gorgona: it is also found on the shores of England, and enters the mouth of the Dee. Ulloa reports them to abound so much along the whole coast of Lima as to exceed all comparison. They come to us in barrels, packed with salt after being cleaned out; and are sold at rather a high price considering the quantities that may be taken: their flesh then appears very red, a circumstance, which, as Mr. Accum informs us, renders it necessary for vendors of fictitious or inquinated anchovy sauce to colour it with Venetian red, which had been previously adulterated with the poison called red-lead: the most common and least injurious colouring matter is bole Armenic. The head of the anchovy must be removed soon after the fish is caught as it is particularly prone to run into decomposition, and would speedily infect the whole fish.

The *Carp*, originally brought from Persia, is amongst the most esteemed of the fresh-water fish: it varies very much in size, according to the country in which it is produced. In Persia this fish grows to the vast weight of 200 pounds, while in this country it is considered very large if it weigh twenty: they abound in the ponds of Sussex. So tenacious of life is the carp, that if wrapped up in wet moss, and thus hung in a net with its mouth uncovered, in any damp place, being occasionally watered, it may be fed for a fortnight with bread and milk: it will even fatten, and improve much in flavour. Although so gentle and familiar in its manners that it will come to the edge of the water at an accustomed signal to be fed, it is so voracious, that if put into a pond where there are gold fish it will soon exterminate them: it in return becomes the prey of its ferocious enemy the pike. It is a long-lived fish: Buffon determined by the scales of one of them that it was 100 years old; but much greater age has been attributed to them. Mr. Tull's invention of improving carp by spaying has been already described. The frog is a great enemy to this fish; it affixes itself firmly to the back of the carp, sticks its claws into the corners of its eyes, and remains there a troublesome appendage, while the fish wastes away, and perhaps dies.

This fish is the more valuable on account of its being in season the whole year round: when its weight is three pounds, it sells for about 2*s.* generally.

The sale of carp makes a part of the revenue of the nobility and gentry in Prussia, Pomerania, Brandenburg, Saxony, Bohemia, Mecklenburg, and Holstein; and the way of managing this useful fish is therefore reduced in these countries to a kind of system, built on a great number of experiments made during several generations in the families of gentlemen well skilled in every branch of husbandry. They construct carp ponds, and stock them with a few breeders, which in a short time fill the pond: there ought in fact to be three ponds, a spawning pond, a nursery, and a pond for adult fish.

Such ponds as are surrounded by poor, cold, stiff soils, or are open to the east and north winds, or have a wood on one or two sides which obstruct the rays of the sun, or contain hard or cold water, or such as issues from mines, moors, or mosses, will never be very productive. Care must be taken to keep water-fowl away from the pond in the spawning season. Every full-grown carp must be allowed a square of fifteen feet in the pond: the more room they have, the quicker the carp will grow; and the more feeding they have, the greater the size to which they will grow.* Mr. Forster has known them to grow to twenty-five pounds weight by living under favourable circumstances. When the pond is covered with ice several holes must be bored in it, for without air the carp would soon perish.

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* Philosophical Transactions, 1771.

The *Tench* is a fresh-water fish, common in the lakes and rivers of England and Ireland, but rare in Scotland. It seldom exceeds five or six pounds weight, but is generally taken of one foot long only. Those sold in London cost three or four shillings each. It is an excellent fish, but is less esteemed than the carp or trout, and formerly was so little valued that it was used chiefly by the lower orders. It is in season from May to the end of September. It is of a dark colour, the sides and belly being of an iridiscent greenish and yellow colour, and is very broad from back to stomach for its length: the skin is remarkably slimy. The river Stour in Dorsetshire abounds with them, and it is said that they thrive best in ponds, or in the most tranquil rivers. It is said to be distinguished among fishes for its stupidity.

The *White-bait* was until lately supposed to be the fry of the shad, or some similar fish; and the supposition was founded on the circumstance that they were never found with a roe. Mr. Pennant was the first that called this opinion in question, and white-bait is now almost universally admitted to be a cyprinus. About the month of July vast shoals of this diminutive fish appear in the Thames, round Blackwall and Greenwich, and to those places, at the proper season, all admirers of this delicacy repair. Yet it is probable that the attractions lie in the cookery rather than in the fish; for it is found that a few persons only succeed in pleasing the public in this Blackwall dainty.

Order V. BRANCHIOSTEGI.

The *Sturgeon* is very common in some countries, but rare in Britain. It varies in size from three feet to eighteen or more: and from its great size its name is derived, the teutonic word *stuhr* signifying great. Those brought into the London market commonly measure from four feet to eight feet, and sometimes weigh nearly 300 pounds. It is a forbidding-looking creature, and has along its back three rows of hard horny knobs, which give it a formidable appearance, although its disposition is mild, and even cowardly. It abounds in the rivers of North America.* In the Canary Islands, they are so common as to be but little valued. The Mediterranean, Caspian, and Euxine seas, afford a vast supply of them: and the Po, the Danube, and the Wolga, abound in them. In Britain, the rivers Eske and Eden are most noted for sturgeon; and from the former was taken one which weighed 460 pounds. They are also found on the northern coast of Ireland. There are at least three kinds; the common, that from which chiefly caviar is prepared, and that which furnishes isinglass. The flesh, pickled, is sent all over Europe, and is a great delicacy. The roe of all the kinds, but particularly of the second, is freed from its membranes, salted, broken down into a sort of paste, drained, pressed, and put into pots; this is caviare: it was formerly much more esteemed in this country than at present, but it is still found in the London shops. It is eaten, spread on bread, either without any preparation, or mixed with a little vinegar.

Mr. Long, after observing on the excellence of sturgeon broth, throws out a suggestion, that fish broths have not met with the attention they deserve. He says, that at Albany, the sturgeon is so common that it is sold at 1*d*. per pound, and is called Albany beef: this resemblance of some parts of the sturgeon to beef has been noticed by others: I conceive it is only in the colour that the resemblance exists; but the resemblance of the white parts to veal is striking, and is universally admitted. Slices of sturgeon, nicely dressed in the manner of a veal-cutlet are only to be distinguished from the latter by the superiority of the meat, and a certain superadded flavour, which appears to me most to resemble that of the scallop shell-fish, and which exists barely in a recognisable degree. This resemblance to veal is equally observable in the appearance of the flesh, both raw and fried, as well as in the taste. It is usual to make sturgeon pies, and these are scarcely distinguishable from meat pies. Were animals to be classed according to their qualities as food, the sturgeon would certainly be removed from the fishes, and placed amongst the land animals: even the back bone, if such it may be called, it being mere cartilage, has the appearance and taste of the harder cartilages in veal. I believe the sturgeon is the only fish which is roasted on a spit like meat.

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* Travels in North America.

The head of the sturgeon is destitute of a mouth in the usual place, but in a part that would be called the throat of other animals is a round opening, the loose integuments of which are capable of being protruded and drawn in: this, which is commonly called the sucker, has no teeth, but answers the purpose of a mouth. This fish is long, compared with its thickness: when the length from the nose to the extremity of the tail is seven feet, the girth of the thickest part about the shoulders will be thirty-two inches; and its weight will be about 150 pounds. The sturgeon is in season during the winter quarter, and part of spring. It sells in London at 1*s.* or 1*s.* 3*d.* per pound, but does not often appear in the market. It should be firm; if flabby its value is greatly lessened. The roe in the recent state is little sought after in this country.

Isinglass is made by cleansing and rolling up the swimming bladder, otherwise called the *sound* of the sturgeon. but an article essentially as good, although not so nice-looking, may be prepared from the sound of a cod.* Great quantities of the isinglass commonly sold are made from the sounds of the beluga, a kind of dolphin. The globe-fish, although poisonous itself, affords good isinglass. Mr. Accum says, that isinglass is often adulterated with shreds of the skins of the dried bladders of horses. The genuine kind consists almost entirely of gelatine, which dissolves in all watery liquids, and forms a well-known jelly; and this is variously modified by the skill of the cook.

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* Philosophical Transactions, 1773

Order VI. Chondropterygii.

The *Lamprey*, like the eel, to which it bears much resemblance, is remarkably tenacious of life, and will live a long time out of the water; nay, it will live some time immersed in diluted ardent spirit. The river Severn affords them abundantly: they are in season during the winter quarter. The old custom of the corporation of Gloucester, of presenting a lamprey pie to the king at Christmas, the dearest time, is well known: at this season each fish sometimes has cost a guinea Henry I. died of a surfeit of lampreys. They are of various sizes, sometimes weighing 3 lbs. This fish is of an excellent flavour, but is not readily digestible, and is quite unfit for weak stomachs. In the present day it is far from being a general favourite; and is rarely seen in London: it is in season in the spring quarter. The Romans were great admirers of this fish. Vedius Pollio fed his lampreys with his slaves. We read of 6,000 of these fishes at one supper. Some of Cæsar's lampreys were 60 years old. The cooking of those fishes has occupied the attention of three great men, Apicius, Horace, and our own much more valuable Camden. In cooking it requires a long continued heat.

The *Ray or Skate* is a flat fish,, having a collocation of eyes, nose, and mouth, which has been compared to the human countenance; and the resemblance is whimsically made use of in one of the prints of Hogarth. It is a nutritious fish, not very delicate; but the small portion of fish that is a favourite at table is thought to be improved by crimping. It may be salted with advantage for keeping: it is in season during winter and part of spring. This fish often weighs 30 lbs. In London, the crimped nice parts sell from 6*d.* to 1*s.* per pound: in Dublin none but the lowest orders make use of it. This fish is not best when quite fresh; it is improved by being kept a day or two.

The *Torpedo*,—a fish which possesses the extraordinary power, like a few other fishes, of evolving electricity at will, and of giving an electrical shock to the person that handles it,—is a species of Ray. So prolific is it in the power of generating or calling into action the electric fluid, that it is capable, when vigorous and is irritated, of giving twenty shocks in a minute. This is one of those surprising provisions of nature by which animals, defective in strength, agility, courage, or sagacity, are nevertheless enabled to overpower and prey on others that possess these qualities: it is thus that the most formidable agent in nature is wielded by this creature for the apparently trivial purpose of ministering to its voracity.

The benumbing power of the torpedo was well known to the ancients; but until the discovery of electricity it was not possible to understand its nature. It was even employed as a remedial agent as we employ electricity. Galen speaks of its being used as a remedy against headach; but honestly admits that he found no great use,—a fact easily explained by his having committed the great mistake of applying the fish when dead, and when of course its electrical powers were extinguished.

This extraordinary fish has, nevertheless, been always used as food. Pliny says, that the liver is the most delicate of all morsels. Apicius has bestowed his attention on the cookery of the fish; and has given a formula that would, in the present day, be considered as producing rather a dose of medicine than a savoury dish. It is in the present day considered a coarse and difficultly digestible fish, with the exception of the parts nearest the head. The small torpedoes are better fish than the large ones.*

The *Shark*. Some of the numerous species of this fish are gigantic and formidable creatures, sometimes weighing nearly two tons. It is said, that once the shark has tasted human flesh he acquires such a relish for it that no other food will serve his purpose if he can procure it: he will perseveringly follow in the wake of a ship, and calmly survey the persons in it, in the expectation that death will consign one or other of them to sepulture in his enormous stomach, — that is the inevitable fate of a dead body thrown overboard when a shark is in attendance; and such is the monstrous size of some of them, that they are capable of containing a whole human being. Notwithstanding the voracity of a shark, he is an epicure; he will not touch the body of a white man when he can procure a negro, — such is the unenviable preference enjoyed by the poor black. The African however takes care to make a proper acknowledgment for their attachment, for he is equally fond of the flesh of the shark, and boldly ventures to assail him in fearful combat in his own element: at the moment when the shark has prepared his jaws to swallow up his so much esteemed morsel, he receives his death wound in the belly, and is dragged on shore, where he affords a substantial meal to a whole community.

The flesh of the shark is eaten without hesitation by ships' crews at sea; it is however tough and unsavory. Captain Rogers, when at Brazil, took several of them, and describes them as having a rank taste. The fins of this fish are esteemed a delicacy; they are dried in large quantities on the Malabar coast, and constitute a valuable article of trade to China.†

The crew of Columbus found in the stomach of a shark an entire turtle; and in another the whole head of a shark, which the sailors had thrown overboard.

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* Commentator on Apicius.

† Forbes's Oriental Memoirs, i. 202.

SECTION V.

Class V. *Insecta.*

Of the insect tribe, numerous as the species are, a few only are used as the food of man. It has already been stated that young bees are eaten, in the honeycomb by the Mauritanian Moors; that a peculiarly disgusting insect is eagerly devoured by the Chinese and Hottentots; that caterpillars are cooked into a dish in some parts of Australia; and that the people of New Caledonia eat spiders.

The Roman epicures were exceedingly fond of eating the *cossus*, or worms of the oak; it was accounted a great dainty.

By some nations, ants and their eggs are commonly eaten; and this kind of diet has even been eulogised by Europeans who partook of it.

Lieutenant Paterson thus describes this food: — "I observed that in consequence of the rains the white ants (with which the whole country abounds) were all out, and with wings. Several of the Hottentots and slaves were collecting these insects, which I found, upon inquiry, were intended for food: prejudice, indeed, alone has prevented the Europeans from making a similar use of them; for in my different journeys in this country I have sometimes been under the necessity of using them as food, and found them far from disagreeable."* This was in the country of the Hottentots, not far from the Cape of Good Hope, and near Zwellendam.

M. Konig, in an essay on these insects, read before the Society of Naturalists of Berlin, says, that in some parts of the East Indies the queen-termes is swallowed alive by old men, for strengthening the back; and that by certain fetid fumigations they expel the termites from their nests, and thus collect vast quantities. Of these they make, with flour, a variety of pastry, which they sell at a low price to the poorer ranks of people. He says that this kind of food is very abundant; but that inordinate use of it brings on an epidemic colic and dysentery, which occasion death in two or three hours.

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* Paterson's Narrative, 1789

Mr. Smeathman informs us, that the Africans are less ingenious in procuring and cooking them: they are content with a very small part of those, which, at the time of swarming, or rather of emigration, fall into the neighbouring waters: these they skim off with calabashes, and bring them to their habitations, where they are parched in iron pots over a gentle fire, and frequently stirred, as is done in roasting coffee. In that state, without sauce or other addition, they serve them as delicious food, and put them by handfuls into their mouths. Mr. Smeathman says, "I have eaten them dressed this way several times, and think them delicate, nourishing, and wholesome: they are something sweeter, but not so fat and cloying as the caterpillar or maggot of the palm-tree: snout-beetle, curculio palmarum, which is served up at all the luxurious tables of West Indian epicures, particularly of the French, as the greatest dainty of the western world." Mr. Smeathman adds, that he has conversed with several gentlemen, and they all agreed that they are most delicious; one compared them to sugared marrow, and another to sugared cream, and a paste of sweet almonds.

According to the Baron de Geer, the Hottentots not only eat these insects, but even grow fat on them: he does not describe their mode of cookery. Other writers mention their being an article of diet in different parts of South America.

The economy of these termites in building their habitations, their government, the discipline of their population, their division of labour, their public works, and their gigantic efforts, afford one of the most curious and interesting subjects of study which natural history affords. He who reads the curious paper of Mr. Smeathman * will be well rewarded for his trouble, and will perceive what vast things are accomplished by appa-

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* Philosophical Transactions, 1781.

rently the meanest creature in existence, what astonishing intelligence is brought to bear on their efforts, and what stupendous results are produced — far more surprising indeed than any thing effected by man, when his means are compared with those of the little termes.

I do not find in any accounts which I have met that the black ant is used as solid food, but a liquor is prepared from this insect which is used as a condiment. The black ant is an extraordinary insect.

Stedman says he saw ants in Surinam, perfectly black, and an inch long, which pillage a tree of all its leaves in a short time, "each making off with a piece the size of a sixpence." He describes their bite as very painful. Mr. Bosman says, that the ants of Guinea are so rapacious that no animal can stand before them: they often in the night attack a living sheep, and before morning have made so perfect a skeleton that no human hands could do the like. They serve chickens and even rats in the same way.

The African black ants are more than an inch long, and their ant-hills are sometimes twelve feet high. Their numbers, perseverance, activity, and painful sting, render them an almost irresistible community; and whatever animal they attack is sure to perish, and to be stripped to the bone. There is an instance of an elephant's carcase, after the wild beasts and birds had devoured the great bulk of the flesh, being so perfectly cleaned by the black ants that the skeleton remained white and polished. We are assured that in Congo the number of these insects is beyond all appreciation, and that they will devour the body of a man, until the skeleton is left as clean as it would be after long boiling.

Black ants contain acetic acid; and in Norlanden vinegar is made from them by immersing a bottle containing some water into an ant-hill: the ants creep in, and when a sufficiency is thus collected the contents of the bottle are boiled to extract the vinegar from the bodies. Perhaps this acetic acid may be the liquor which the black ant injects into the wound when it inflicts its painful bite.

Herodotus assures us, that in a sandy desert of India there were ants of an enormous size which he describes as being between a fox and a dog. It is not easy to understand what animal this was that he designated an ant.

Sir Hans Sloane states, that the silk-cotton tree worm is esteemed by the Indians and Negroes beyond marrow. This worm is no more than a large maggot, being the caterpillar of a large capricorn beetle, or goat-chafer.

The *Locust*. The passage in Scripture, which declares that St. John used locusts as food, has been much commented on; and some have supposed, that by the word which has been translated *locust*, some sort of bird or plant was intended, because they say the insect locust is unnatural and unusual diet for man: the objection is however scarcely worthy of notice, so notorious is the fact that several nations of the globe eat these insects. Forbes, the oriental traveller, says, "I am surprised that commentators on the scriptures have perplexed themselves about the food of John the Baptist in the Wilderness, which we are informed consisted of locusts and wild honey, and for which the cassia, fistula, or locust tree, and many other substitutes, have been mentioned: but it is well known that locusts are an article of food in Persia and Arabia at the present day; they are fried until the wings and legs drop off, and in that state are sold in the markets, and eaten with rice and dates, sometimes flavoured with salt and spices." * Hasselquist was assured by a Greek priest, that the Church had never taken the word locust in any other sense; and laughed at the idea of its being a bird or a plant.

The eating of locusts has been recorded by historians and travellers of the earliest ages. In the first place, there is an express permission, in Leviticus, xi. 22., to eat "the locust after its kind." It is mentioned by Diodorus Siculus, that the Acridophagi, a nation of Ethiopia, fed upon them; that they lived but forty years that insects with wings were generated under the skin, which occasioned itchiness; that the sufferer tore them out with his nails; and eventually died in the most miserable tortures. It is stated by Herodotus, that the Nasamones, a nation of Libya, caught locusts, dried them in the sun, and ground them into a powder, which they mixed with milk, and ate. According to Pliny, the locusts of India, or rather one of them, would afford a substantial meal; he represents them as three feet long, and says that the people used their dried legs and thighs as saws!! Many others of the ancient authors also speak of locust eating.

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* Oriental Memoirs, i. 31.

The locust, small as it really is, has been sometimes more destructive to the well-being of man than all the rest of creation together. They often appear in vast swarms, which literally darken the air; and which, descending on the earth, lay waste the country for miles, depriving the ground of all traces of herbage, and the trees of their leaves; nay, the bark itself does not always escape. But their devastations do not end with their lives: the countless myriads of their dead bodies, running into putrefaction, so infect the air with pestilential miasmata that the plague is often the result, and thousands of human beings are swept off the face of the earth at a few hours notice! Sometimes however, when they appear in moderate swarms, they indemnify the losses they occasion by the food they return.

Sir John Chardin says, that while in Persia he observed, one evening in March, that the air was darkened as if by clouds; but he soon found that these were clouds of locusts. Prodigious numbers fell to the ground, the largest that he had ever seen, and so many that they could not rise again. The peasants gathered them, and told him that in this season such clouds appeared almost every night: they dry and salt them, and live upon them as their common food. It is mentioned by Jonas Hanway, that in the country about Astracan, towards the end of July, the locusts fly in such prodigious numbers as to appear at a distance like a heavy cloud. Dr. Shaw says, that the locusts in some parts of Barbary are three inches long. Of such a size, with such voracious propensities, and in such numbers, they well might constitute one of the plagues of Egypt, notwithstanding their being such good food as some have described them.

The Arabians, Caffres, and Hottentots, consume vast quantities of locusts when they are plump; those that are full of eggs are most esteemed. The Hottentots fatten on them; and make a brown soup of them by some of their delectable processes of cookery. They are sold in the markets of Arabia, dried, or salted: and in times of scarcity are ground in hand-mills, made into cakes, and baked. On other occasions they are variously dressed, as broiled, boiled in milk, fried in oil or butter, or roasted alive: when fried, they turn reddish, like shrimps, and are said to have the taste of cray-fish; others have compared their flavour to that of the little fish called the sardine, which is often substituted for anchovies. Dampier says, that the people of Grafton island catch the locusts in nets, and broil, or bake them in an earthen pan: he describes this dish as not ill-tasted.

The wild mountaineers of Asam do not hesitate to eat locusts that had died a natural death. But nothing of this kind is to be wondered at in the case of a people that occasionally suffer so much from hunger as to be obliged to suppress the cravings of nature by tying a ligature round the abdomen.

The locust is eaten in several parts of Egypt, Syria, Arabia, Persia, Barbary, the south of Africa, and in some parts of the south of Europe: being so generally used, it cannot be a very bad article of food. It does not appear however to be so nutritious as to sustain the constitution in a state of vigour for any considerable length of time; for it is said, that those who feed exclusively on them for a long while become attenuated, weak, and indolent. It is probable that such a state of health predisposes them to the effects of the pestilential effluvia which arise from the putrescent remains of these insects when they swarm in any country, and that this greatly assists the spread of the plague. It is not improbable that as poor diet tends sometimes to the production of vermin, the accounts of the acridophagi may have had some foundation in truth; although not to the extent reported.

The Boshmens, a predatory, savage, and half-famished tribe of the Hottentots, not only eat locusts, but their larvæ; and frequently, so improvident and reckless are these wretched people, that this is the only diet procurable. They at least have the care to dry and preserve them for use, and they deem them excellent food. Such is their distress that they are glad to feed upon grass-seed (*Paterson*); as also raw roots, berries, and plants diversified with ants, grasshoppers, snakes, and spiders. (*Sparman.*)

Section VI.

Class VI. *Crustacea.*

The *Black-clawed Crab*. This well-known marine animal affords a curious example of advantages and defects of construction. It is an extremely bad swimmer; it can walk on the bottom with some celerity; but neither by swimming nor running could it prevent its destruction by other inhabitants of the deep. It is therefore cased in a complete suit of armour, even to the finest tips of its legs, of such extraordinary hardness that the large kinds will bear a considerable stroke of a hammer without being fractured. Its strong claws, terminated by powerful nippers, are formidable weapons, enabling the animal to seize its enemy, and pinch desperately. Conscious of these advantages, the crab is a pugnacious animal; and will quarrel, attack, fight, and pinch, with great determination, little regarding the efforts of ordinary enemies, for its shell renders it insensible to pain from external causes. This insensibility is clearly shown by the fact, that, in these contests, the crab often seizes its own leg, pinches it with the greatest fury, unconscious of the mistake. In their conflicts with each other, it often happens that one or other is killed.

But a time of retribution at length arrives, when, the armour thrown aside, the naked defenceless body of the crab is exposed to the assaults and insults of the most contemptible enemies: totally incapable of the smallest resistance, the animal is obliged to entrust its raw and tender body to the concealment of some hole or cranny in the rocks, — for so tempting a morsel would have no chance of escape; and in this wretched condition thousands of them fall a prey to fishes that previously would not have dared to approach them. Sometimes the new shell hardens prematurely, and the crab remains a prisoner between the rocks: yet even then it continues to grow.

The casting of the shell is a singular process, which takes place annually. The crescent-shaped texture opens, the shell spontaneously splits, the breastplate falls off, and the crustaceous coverings of the claws are detached in some way not understood; but the fact is certain. The body is now left enveloped with a skin like wet parchment: the external surface soon begins to harden; and in some time the animal recovers his defence, his courage, and his voracity. It is a curious but well established fact, that, if one of the claws or legs be injured, the crab has the power of throwing it off altogether from the body, and in its place a new one will grow, which, however, never becomes quite as large as the original one; it can even crack and break its own legs or claws, and drop them off, without having sustained any previous injury; and this does not take place from the joints, but in the smallest part of the limb.*

The crab is in best season in spring, and is at that period considered excellent food. The meat contained in the claws is white, and of an exquisite flavour, being an example of a pure fishy taste without the slightest degree of rankness, and so wholesome that it rarely disagrees with the weakest stomachs. But the meat contained in the great shell is soft and yellow: its taste is less agreeable, and less pure: and this is the portion which occasionally produces such disturbance of the constitution when eaten.

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* Collinson, Philosophical Transactions, 1746 — 1751.

Crabs are taken in wicker baskets, constructed somewhat on the principle of mouse-traps, and properly baited with garbage. They are abundant on all the coasts of the United Kingdom, and indeed of most parts of the world. Occasionally they grow to a very large size: when full-grown they weigh seven pounds; but one has been caught which weighed twelve pounds. They herd together in distinct tribes: a crab, marked on the back, has been put into the water two or three miles from where he was taken out; after some time, he has been caught by the fishermen amongst his old associates at home.

If a crab be thrown into hot water, he casts off all his legs together; for which reason, when it is to be boiled, it is put into a pot of cold water, which is *warmed very slowly till the creature gradually dies!!* *

The *Land Crab,* in form, somewhat resembles the common crab, but its shell is heart-shaped; its legs are beset with thorny hairs; its colour is light brown, or a blackish-violet. It does not grow to so large a size as the common crab, seldom exceeding six or seven inches in length. It engages in desperate combats, and has recourse to a singular mode of warfare. the crab seizes the enemy with its nippers, pinches desperately, and, while the nippers hold fast, the crab detaches the limb, moves off, and leaves the enemy to combat with the claw. The loss of the claw is but a temporary inconvenience, as it is in some weeks replaced.

These land-crabs are natives of tropical climates, and inhabit the mountains. They regularly march once a year down to the sea side, in a body of some millions at a time, and so thickly covered by them is the ground on these occasions, that it is scarcely possible for a person to walk there without treading on them. They march to the sea without turning out of their way to avoid an obstacle, if they can clamber over it, even though it were a house; if it be a considerable river they wind along its banks, but if a small one they ford it. They prefer marching during the cool of the evening, or during rain by day: after a journey of perhaps two or three months, they arrive at the sea coast, and there they deposit their spawn. The young ones being hatched under the sand by the heat of the sun, quit the shore, and slowly ascend the mountains: the old ones however remain in the plains, in a feeble state, and, after some time, cast their shells. They are now quite naked, and remain motionless for about a week, when they begin to grow fat, and then are delicious eating. Soon after they also ascend the mountains, and arrive there after a laborious and perilous journey of about six weeks from the time of spawning.

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* Collinson, Philosophical Transactions, 1751

At the time that the crabs have descended into the plain, the natives lie in wait for them, and destroy thousands: but such is the profusion of this dainty, that only the most delicate morsel of each, viz., the small spawn, which lies on each side of the stomach, within the shell, is eaten, the bodies being neglected. But it is on their return after spawning, when their shells are cast, and the body is tender and plump, that they are chiefly valuable, for then all parts, except the stomach, are delicious.

These crabs vary in their appearance and qualities. Some are excellent and wholesome food: and so much so, that the negroes in the sugar islands in a great degree subsist on them at certain times, and become fat. Others are poisonous. The darkest colours are the most dangerous, and the lightest are the most wholesome.

They are sometimes put into a potato garden, in order to fatten them, previously to being eaten.

The *Cray-Fish* or *Craw-Fish*, is an inhabitant of fresh water, and indeed only of the purest water: it may be considered a species of fresh water lobster. It makes a hole in the bank of the river, where it resides during the day time, but comes out at night to seek its food. Like the crab, if a claw be broken off or injured it will be replaced by a smaller one in a few weeks ; and if this be broken again, it will even be reproduced.* While the animal is alive, its colour is of a blackish-brown: sometimes it exceeds the size of the largest lobster and it is said to live twenty years. Admiral Drake found a sort of cray-fish, which lived on land, in an island south of the Celebes, and of so extraordinary a size that one of them was sufficient to satisfy the hunger of four persons: they burrowed in the ground like rabbits. The country adjacent to the shores of Carthagena was named *Calamari* by the Indians, — that is, the land of cray-fish, from the vast quantities of these creatures found there. The flesh of the cray-fish is rather coarse, and is far inferior to that of the lobster.

The *Shrimp* is common on the shores of all Europe : they come up the mouths of the rivers, and are caught so abundantly, that they are sold at a very low price. While alive, they are almost transparent. The flesh of this little animal has an exquisite flavour, and is a universal favourite in various forms.

The *Prawn* very much resembles the shrimp, but is larger. Good prawns are of such size that six dozen weigh a pound . at their first coming in, that quantity would cost in London, perhaps 4*s*., while in maritime towns they would sell at 1*s*.

The *Lobster* is an inhabitant of the seas of all Europe : it is common on the coasts of the British isles ; but is abundant, and of an excellent quality, on the coasts of Scarborough and Northumberland. The large ones are in their best season from October to May ; but many of the small ones are good all the year round. Those that for their size are heaviest are preferred for the table: hardness of the shell on the sides is a good sign, so also is the adherence of small marine animals to the shell. Cock-lobsters are preferred to hens in winter, and are distinguished by their narrow tails. The flesh of the lobster's claw is more delicate than that of the tail: they are caught either in basket-traps, or in bag-nets, baited with fish-entrails. In summer lobsters are more active, and are taken in six fathom water; but in winter they retire to twelve or fifteen fathoms. They cast their shells and claws much in the same manner as crabs. When alive, their colour is blue-black, but when boiled it is bright red. It is said that loud noises, such as thunder or cannon shots, so terrify them that they cast their claws; and hence the maritime jest of firing a cannon near the lobster fishermen while engaged in their occupation. A lobster is capable of springing thirty feet at one bound; and, like a harlequin, of passing through a hole little larger than what suffices to admit the body.

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* Reaumur, Mémoires de l'Académie, 1712.

The flesh of the lobster needs neither description nor panegyric. nothing can exceed its purity and delicacy of flavour. The greatest perfection of it is to be eaten fresh; for in two days after it is boiled it loses its sweetness of taste, although still perfectly sound.

SECTION VII.

Class VII. *Testacea.*

THE *Cockle* has a shell somewhat heart-shaped; its valves are toothed at the edge, its hinge has four teeth. It buries itself by an extraordinary process in the sand, sometimes to a considerable depth, from which it is rooted out by those who collect them; or they may be gathered from the surface of the sand, on which they lie in considerable numbers. They vary very much in size; and the largest have as fine, or a finer flavour than the small. The raw state is more generally approved, for by scalding they become rather tough, but still retain an excellent, although altered flavour.

The *Oyster* has always ranked amongst the prime delicacies of the table. In the time of Pliny, oysters were the epicure's chief delight; much attention was bestowed on their improvement, and their habitudes seem to have been well understood. He says that they love fresh water, and prefer those coasts where many rivers discharge into the sea; that they are fond of being transported from their native shores to distant waters; a statement well known to be correct, for this removal is practised in the present day with the Colchester oysters. He informs us, that the first person who invented artificial modes of improving and keeping oysters in beds for sale was Sergius Orata; that he first brought Leucrine oysters into credit for their excellent taste; and that English oysters were then unknown to the Romans, because the British coasts did not then belong to them, although he admits that they were afterwards considered the best of all others: oysters were then brought from Brundusium, and fed in the Leucrine lake. The fate of the Leucrine lake was curious: in 1538, during an earthquake, the lake disappeared, and in its place rose up a mountain. Such keen judges of the perfection of oysters were the Romans that they cooled them with snow previously to bringing them to table, and Pliny ridicules them for their epicurism in this respect.

Oysters spawn in May; the spawn appears first like drops of candle-grease, and sticks to any thing it falls on. They are covered with a shell in two or three days, and in three years are fit for market. As they remain in the places where laid, and grow without any other food, apparently, than the afflux of sea water, it is the custom at Colchester, and other parts of the kingdom where the tide settles in marshes on land, to pick up great quantities of small oysters along the shore, which when first gathered seldom exceed the size of a sixpence: these are deposited in beds, where the tide comes in, and in two or three years grow to a tolerable size. They are said to be better tasted from being thus sheltered from the agitations of the deep: and a certain quantity of fresh water entering these repositories is said to improve their flavour, and to increase their growth and fatness. The oysters prepared in this manner are by no means so large as those found sticking to rocks at the bottom of the sea, and usually called rock-oysters: but great size and fine flavour rarely coincide.

Oysters vary much in size; some of the best in Great Britain are exceedingly small. It is stated in Dampier's Voyage, that on the coast of the island of Celebes, oysters were found of so extraordinary a size that one of them was sufficient to serve seven or eight persons. The Brazilian oysters are so large that the shells are converted into culinary vessels. This large species is said to be in no respect equal to the small oysters of Great Britain. It is stated by Leuwenhoek, that a parent oyster sometimes produces between 3000 and 4000 young.

In Moore's Travels into the interior of Africa, the tree oyster is thus alluded to: — A night or two after (he says) I supped on oysters that grew upon the trees. Down the Gambia, where the water is salt and near the sea, the river is bounded with trees called mangroves, whose leaves being long and heavy weigh the boughs into the water: to these leaves the young oysters fasten in great quantities, where they grow until they are very large, and then cannot be separated from the tree but by cutting off the boughs with the oysters hanging on them resembling ropes of onions.

The pearl oyster affords a very inferior description of food. The officers of Lord Anson's expedition found them tough, unpalatable, and unfit for eating.

The *Scallop*, one of the finest of our shell-fish, is remarkable for the sweetness and purity of its flavor: it has even in a slight degree a kind of saccharine sweetness when fried. The motion of this animal is singular: "when it finds itself deserted by the tide it makes very remarkable efforts to regain the water: it first gapes with its shell as widely as it can, the edges being often an inch asunder; then it shuts them with a jerk, and by this the whole animal rises five or six inches from the ground; it thus tumbles forward, and then renews the operation until it has attained its journey's end. When in the water, it is capable of supporting itself upon the surface, and there opening and shutting its shells it tumbles over and over, and makes its way with some celerity." (*Goldsmith.*)

Dr. Lister describes a thick and extraordinary muscle belonging to this animal which is wonderfully extensile even much beyond the edge of the shell, formed into segments, and variegated with the most elegant rufous lines. He conceives that this may not only serve for catching its prey, but even for killing any small animal by strong pressure; and also by its undulating power, which is very remarkable, it may convey the food round from whatever part it is in to the mouth; thus supplying the place of a hand.*

The *Mussel* is abundant on the coasts of the British isles, and so much so on the coast of Cumberland that it is used to manure the ground. These animals are found in beds: occasionally in warm climates they grow to a very great size. The mussel is furnished with a remarkable beard which it insinuates into the sand, or attaches to a rock, and holds itself fast thereby. On this account it has been supposed by Dr. Bartram to be partly of a vegetable nature, and that through these *roots* it draws some part of its nourishment! This beard is supposed by some to be the offending part when the mussel disagrees as food, which it is well known often to do, and hence it is always extricted before the animal is eaten. Even when this has been done the fish is not always safe, and it is found by experience that its wholesomeness depends on some unknown circumstance, perhaps its occasional food, which sometimes imparts to it a poisonous quality. The eating of mussels has often produced much mischief. They are in season from July to October. Dr. Goldsmith says, "some of this kind have been found a foot long. I have seen the beards a foot and a half long: and of this substance the natives of Palermo sometimes make gloves and stockings."

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* Lister, Philosophical Transactions, 1697

These animals are found both in salt and fresh water. It is of the shell of a species of mussel that mother-of-pearl is obtained.

There is a pearl-mussel fishery on the river Conway, in North Wales, where pearls are obtained, sometimes, but rarely, the size of a moderately large pea.*

The *Edible Snail* or *Helix pomatia* — so called from the circumstance of its feeding upon apples when procurable — has been known as an article of food from a very remote period. According to Pliny, these animals were brought into use at Rome by one Fulvius Harpinus. They were introduced from Italy into Britain, about three centuries since, by Mr. Charles Howard, and Sir Kenelm Digby; and at this moment they swarm in some of the counties of England. The Romans reared them in places called *cochlearia*, which were surrounded by water to prevent their escape; they were situated under rocks or projecting places, shaded from the sun and kept continually wet by a passing rivulet. The snails were fattened with bran and sodden-lees of wine, with a few laurel leaves: they grew very large, and some to so monstrous a size, that, if we are to rely on Varro, the shell of one of them would hold ten quarts. In England the shell rarely exceeds two inches in diameter, but in the south of Europe they grow much larger. They are taken in the woods and in hedges. In Switzerland they are bred and reared in immense quantities, and are exported. They are used as fasting-fare in Lent, in Roman-catholic countries, seasoned with pepper, salt, and oil; sometimes fried, sometimes boiled, and occasionally stuffed with forced-meat. They are a favourite dish with the Sicilians.

Those that are large and fat are said to be good food, and often sell at a high price: they are supposed to be nourishing: indeed, the common garden snail has formed an article of the *materia alimentaria* of consumptive persons for ages past in this country, as food possessing moderate nourishment without the stimulating qualities of butchers' meat; but at present I believe it is never, or rarely used.

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* Magazine of Natural History, iii. 133.

In the island of Borneo, a kind of sea-snail is used as food; and is considered a very great delicacy. It is sometimes so large as to weigh half a pound. The local name of it is "swalloo."

CHAP. IV.

PROCESSES TO WHICH ANIMAL FOOD IS SUBJECTED TO PRESERVE IT OR FIT IT FOR USE.

HAVING given a description of the principal animals used throughout the globe as food, it remains to present the reader with a short account of the various processes to which animal food is subjected, with a view to preserving it in a wholesome and agreeable state for future sustenance, or to correct some disadvantageous quality, or to improve flavor, or to modify its physical condition and render it more easy of assimilation. These objects shall be the basis of a division of this chapter into different sections.

SECTION I.

PRESERVATION OF ANIMAL FOOD.

In the first volume of this work, the nature of putrefaction was explained, and several modes of counteracting it were described. In this place, it will be necessary to mention the chief modes made use of for preserving animal food.

The most obvious method is the application of a degree of cold, sufficient to solidify the juices, and thus to suspend the operation of the septic principle. Meat, that is perfectly frozen, may be kept sweet any length of time; and of this, the case of the mammoth, described Vol. i. p. 133. affords sufficient proof. The frozen markets of Russia are well known. In the country about Hudson's Bay, the flesh of all animals used as food there, whether quadrupeds, fish, or fowl, are preserved perfectly by the cold; and the two latter, even without being cleaned out. Ellis says, "We could keep our provisions sweet, as long as we pleased, without the assistance of salt; for our game froze the instant it was killed; and some remained so from October to April, when it began to grow moist." * Several other instances of preservation of animal matter by cold have been given in Vol. i. p. 133.

It is, however, doubtful whether provisions thus preserved do not suffer. It is a common opinion amongst the butchers of this country, that meat once thoroughly frozen, never recovers its fine flavour. Mr. Boyle, on the authority of General Drummond, informs us, that a fish preserved by being frozen, if thawed before a fire, becomes hard and is spoiled: but that if thawed in cold water, it will become tender, and fit for the table. † In Canada, where animal food of all kinds is preserved for many months by being frozen and packed in snow, they carefully avoid softening it in warm water previously to its being cooked, as it is known that it would very speedily putrefy; cold water is therefore used. Nay, something like this takes place in the living human body: when a limb is frost-bitten, if immersed in warm water, or brought near the fire, it will speedily run into gangrene; hence it is the practice to rub it with snow, and to elevate the temperature with the greatest possible caution.

Experiments on the preservative power of cold on provisions, occasioned the death of the illustrious Lord Bacon. While there was snow upon the ground, his lordship, then at Highgate, took the opportunity of stuffing a hen with it, to try the power of its antiseptic

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* Voyage for Discovery of a North-West Passage

† Works, i 609.

agency. Immediately after, he took ill; and, in a few days, the world was deprived of one of its brightest ornaments.

Reduction of temperature ever so little below that of the atmosphere is of use during warm weather; and hence meat is always kept in the most shaded and coolest places. It is a practice with some persons to cover meat in warm weather with a cloth steeped in vinegar; the acid vapour keeps off flies, and the moisture occasions cold by evaporation. A wet cloth will be always found colder than the surrounding atmosphere, as will be evinced by rolling up a thermometer in it. I found a wet towel, freely exposed in a room of which a window was open, to be but 68°, when a thermometer hanging in the room was 78°. A difference of 10° in sultry weather is of some importance in the preservation of meat.

Exclusion of the atmosphere is also a great means of preventing the putrefaction of animal food. It is an old practice first to dress the meat, then to cut it in slices, and to place the slices regularly in layers over each other, in a close cask: lastly, to pour clarified melted butter in to fill up the interstices, and to cover in the cask closely.*

Mr. Boyle made several important experiments on this subject. A piece of roasted rabbit was included in an exhausted receiver of an air-pump for two months, in winter, at the end of which time it was not sensibly altered in colour, taste, or smell. Boiled meat was included in an exhausted receiver, and the interstices filled with broth of the same meat, a little too salt. In 24 days, the flesh was found perfectly sweet and tender: the broth was acidulous, but still grateful.

He hence inferred, that meat may be preserved at sea by keeping it first in screwed exhausted vessels, as long as by experience it had been previously ascertained that it will keep: then boiling it perfectly, and returning it into the same receivers, when it will, he conceives, keep a great while, without salt.†

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* Boyle, i. 52.

† Idem, ii 633. 647

This principle has been since reduced to practice; and more fully developed in Appert's method of preserving animal and vegetable substances. In this process, the chief requisites are vessels perfectly impervious to air, sound corks, well fitted in, and an air-tight lute. M. Appert uses glass jars with wide necks, for solid substances; and for liquids, he employs glass bottles. For sealing the casks air-tight, he finds a lute, composed of newly-slaked lime and cheese, obtained from skim-milk, to answer perfectly. For greater security, the cork may be tied with wire; and the bottles may be enveloped in muffs made of thick canvass, to protect them from being broken by striking against each other. Sometimes the canvass is pitched on the outside.

In order to preserve beef or mutton, and their broth, by this process, the following are the steps: — The meat is put down in a pot to boil in the ordinary way; when three-quarters done, half of the meat is to be taken out, the bones of this portion having been previously removed: the remainder of the meat is to be boiled thoroughly, the broth strained, and when cold poured into the bottles, which are then to be corked, luted, tied, and wrapped in the canvass, as already described.

The meat, which had been taken out when three-quarters boiled, is to be put into glass jars, and the interstices filled up with some of the broth. These also are to be corked, luted, tied, and wrapped as before.

The bottles of broth and the jars of meat being placed standing upright in a boiler, cold water is to be poured into the boiler, until it rises as high as the rims of the bottles and jars. A lid is put on the boiler with a linen cloth between them, intended to prevent loss by evaporation. Fire being supplied, the water is made to boil, and is kept at this heat for an hour: the fire is then to be withdrawn, and in half an hour more the water is to be drawn off by the cock beneath; in another half hour the lid of the boiler is to be removed;

and in one or two hours the bottles and jars may be taken out.

When gravy is to be preserved, the following is the process: — M. Appert directs the gravy to be made in the proportion of two pounds of good meat and poultry to one quart of water: and the best pieces of meat and poultry are to be taken out when one quarter dressed. The gravy, strained and cooled, is to be bottled; and the bottles, after being corked, tied, and luted, are to be placed in the boiler as before. The meat and poultry which had been taken out when one quarter dressed, are, when cold, to be put into jars; and these are to be filled up with some reserved gravy: when corked, &c., they are to be placed in the boiler, beside the bottles. Water is to be poured into the boiler till it stands as high as the necks, and the cover being put on the boiler, heat is to be applied: the water being brought to a boil, that temperature is to be maintained for two hours, the fire is then to be withdrawn, and in half an hour more the water let off. The beef, poultry, and gravy, thus prepared, will keep good for two years.

Eggs are preserved according to M. Appert's method, in the following manner: — Let newly laid eggs be put into jars, and packed with raspings of bread: the jars being corked and luted, are to be exposed in the water-bath to the temperature of 200°. In six months these will be as fresh as ever.

Milk is to be evaporated to one-half, and to every 10½ quarts of milk, originally used, add the beaten-up yolks of eight eggs: the whole is to be well mixed, and again placed on the fire for half an hour, during which it is to be skimmed frequently; it is then to be strained, and, when cold, bottled in the usual manner: the bottles are then to be submitted to the boiling-water bath, for two hours. In eighteen months this milk will be as good as ever, and if churned will afford good butter.

Cream may be preserved by evaporating it from five measures to four, in the water-bath, it is then to be allowed to cool, and the skim which forms is to be removed. Being bottled, the bottles are to be corked, luted, and exposed to the boiling water-bath for an hour; this cream will, in two years, be as good as the first day, and will be capable of affording butter.*

In these processes, the oxygen of the small quantity of atmospheric air which must have remained in the bottles, appears, from the experiments of Hildebrand, to be converted into carbonic acid. had it remained unaltered, it would have promoted putrefaction; for Hildebrand found, that oxygen, mixed with a small quantity of azote, promoted putrefaction more than even pure oxygen would have done. The bottles, after the process, therefore contain chiefly carbonic acid, which does not act injuriously on meat. The conversion of the oxygen into carbonic acid, by the agency of the meat, would take place as well without heat: hence the action of the heat must be to produce some unknown influence on the affinities which retain the elements of the meat in combination. The animal matter will, in this state of things, remain a long time unaltered. but if there be the smallest leakage through the corks common air will enter, and putrefaction will speedily commence.

The process of Appert is curious and useful, and was the contrivance of a person whose efforts seem not to have been aided by scientific knowledge. It is certainly not entirely original, but it had the merit of embodying vague and floating opinions into a fixed rule, the results of which are certain. So far is it from being entirely original, that there is scarcely a step in the process which in principle had not been anticipated by the experiments of Mr. Boyle. There can be little doubt, however, that Appert was unacquainted with these experiments, and he therefore is entitled to the chief merit of the invention. Instead of glass bottles, which are expensive and hazardous, large tin canisters have been substituted; and instead of luting, soldering has been substituted for the purpose of hermetically sealing the canister and its cover. A process of this kind, perhaps somewhat modified, was adopted, with great success, in storing the ships which have of late years been equipped for the arctic expeditions.

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* The Art of Preserving all kinds of Animal and Vegetable Substances, by M Appert, 1811

Somewhat on the same principle of excluding the atmosphere, but very differently reduced to practice, is the patented method of Mr. Donaldson, for preserving animal and vegetable substances. A solution of gum is made into a paste with meal of barley or wheat, and the paste is baked in an oven until perfectly dry; it is then reduced to powder: the meat, either raw or dressed, or other matter, is packed in wooden boxes, and the powder filled in, so that the contents shall be protected from the contact of the atmosphere.

Both flesh and fish are sometimes preserved on the principle of excluding the atmosphere, by placing them in tin, earthen, glass, or wooden vessels, and pouring over them melted suet, wax, or clarified butter, until the interstices be filled.

Parmentier informs us, that eggs are preserved by a process founded on the same principle. They are arranged in layers, in boxes or earthen pots, and each layer is interstratified with chaff of sarazin, in French called *boquette*, to the depth of half an inch. When the box is full it is to be covered, and its position changed every day. It is found that the bran of wheat is not so proper for this purpose.

Fecundated eggs do not keep so well by this process. Parmentier states, that the best way of preserving them is to put them into pots, and cover them with melted butter. In this state they will keep a very long time; but the method is expensive.

Some preserve eggs by packing them in salt. It is likely that the salt does not act as an antiseptic, but as a means of excluding the contact of the atmosphere.

Some interesting experiments have been made by Hildebrand, on the preservation of animal matter by confining it in certain gases: probably some useful practices might be founded on it. He hung pieces of muscular meat, of the same quality and weight, in the various gases for eleven days, and on the evening of the eleventh day removed them; the results were the following: —

1. That which had been exposed to oxygen gas became red, and showed symptoms of putrefaction.

2. In hydrogen gas the meat became brown, but it did not acquire the least bad smell, nor was there the least tendency to putrefaction.

3. In carbonic acid the meat grew flabby, and livid; it resembled cooked meat at length, was flexible, was not moist or sticky, and had no sign of putrescency. Being afterwards exposed to the atmosphere, it dried without putrefying.

4. In nitrous gas the meat became red, but did not acquire the least ill smell. When afterwards exposed to the air, it dried more speedily than in the former case, and became brown.

These experiments were conducted while the thermometer ranged between 48° and 77°. Such was the antiseptic power of hydrogen, that meat confined in it, even for 51 days, had not the least bad odour. The same result was obtained in the case of carbonic acid gas.

From these experiments, M. Hildebrand drew the following conclusions: —

1. Hydrogen gas preserves and increases the cohesion of dead flesh, by drying it. Oxygen diminishes this cohesion, by rendering the meat moist and flaccid.

2. Meat undergoes alteration, and becomes dissolved much sooner in oxygen, when mixed with azote, even very little azote, than when the oxygen is pure.

3. Nitrous gas strongly resists putrefaction; it holds the next place to hydrogen; and after nitrous gas, carbonic acid gas is next in preservative power.

4. Meat becomes putrid less readily in oxygen gas than in atmospheric air; but when putrefaction does take place, it goes on more rapidly than in atmospheric air; and the vapour arising from it is much more offensive

5. Hydrogen, nitrous gas, and carbonic acid gas, suffer no change from being exposed to the action of meat.

6. Oxygen is changed into carbonic acid by being exposed to the action of meat.

These experiments seem to promise important results if prosecuted and applied to practice; and it is singular that so little attention has been bestowed on them. There is no difficulty in inclosing meat in tin canisters, filling the canisters with hydrogen, and hermetically sealing them.

Even carbonic acid, dissolved in water, has been affirmed to possess the power of preserving meat. Sir William Lee communicated to Dr. Priestley this fact, of which he was the discoverer. His process was, to wash the meat frequently with water, impregnated with carbonic acid: he declares that it will preserve the meat a long time sweet, even in hot weather.*

In the first volume of this work, page 341, some notice has been taken of the preservative powers of the empyreumatic tarry vinegar, called pyroligneous acid. I believe this liquid is more generally made use of, in the curing of fish and flesh, as a substitute for wood or turf smoke, than the public are aware of; and perhaps it acts to the full as well, if not better, for communicating flavour, and acting as an antiseptic. Many striking facts have been stated on this subject, at different times, which ought not to be lost sight of. Hams, intended for smoke-drying, are usually cured with a less quantity of salt, even one-half the quantity is often made use of. Were such hams attempted to be preserved without being subjected to the smoking process, or to some equivalent, they would not long keep sweet:

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* Priestley on Air, iii. 564

but it has been found, that by mixing about an ounce measure of pyroligneous acid in the pickle, containing the half proportion of salt, and intended for a ham of ten or twelve pounds, and brushing the ham over once or twice with the same acid before it is hung up, it will keep and taste as well as if exposed to smoke for two months; beside that, the meat will retain more of its natural juices. Tongues may be similarly treated with equal effect.

The following experiment evinces that the effects of pyroligneous acid, as a preservative, are considerable. Two specimens of meat were cured by pyroligneous acid; one was sent to the West Indies to try the effects of climate on it, and brought back on the return of the ship: the other had been hung up at home. Both specimens were then compared, and were found to be perfectly and equally sweet, although fifteen months had elapsed since they had been cured.*

The preservative power of sugar is well known. It is a common practice of housekeepers, who preserve meat by salting, to add a *small* quantity of sugar, in the hope of aiding the antiseptic power of the salt. That this practice is founded on a sound principle, may well be doubted. A large ratio of sugar certainly preserves, but a small one has a contrary effect; and, although the ratio of salt and sugar conjointly may be large, that of the sugar alone is small, and a tendency to putrefaction may be generated, which, however, may or may not be resisted by the salt. When sugar is to be used, it should be employed in a tolerably large quantity, as will be hereafter specified when we come to the consideration of the actual manipulation.

Don Eloy Valenzuela, curate of Bucaramanga in South America, has ascertained that meat may be preserved fresh for many months by keeping it immersed in molasses, that is the syrup which remains after all the sugar has been crystallised from it. Whether the meat becomes impregnated with the sweetness in such a manner as to be rendered disagreeable does not appear.*

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* Philosophical Magazine, lvii 10 140.

Be this as it may, a useful addition to our knowledge of domestic economy has been made by Dr. M'Cullagh, in the discovery of the fact, that fish may be preserved by even a small quantity of sugar: he thus preserved salmon, whiting, and cod, without any salt, for several days, and found them when boiled just as good as when first caught. The process is to open the fish and apply the sugar in the muscular parts, leaving the whole in a horizontal position for two or three days. If the fish be intended for long keeping, it may now be dried, care being taken to wipe it, and to expose new surfaces to the air frequently, to prevent mouldiness. Thus preserved, the fish when dressed will be found, Dr. M'Cullagh says, much superior to that which has been cured with salt or smoke: the sugar communicates no disagreeable taste. For a salmon of six pounds weight, a table-spoonful of brown sugar is sufficient, salt may be added for flavour if desired, but it does not add anything to the preservative power of the sugar. If hardness be required, a tea-spoonful of saltpetre may be substituted for the salt.

This mode of curing, if successful, is of great use, as the action of salt greatly injures the natural fine flavour of most kinds of fish, and hardens their substance.

The following original article on the method used in Scotland for preparing what is there called Salmon-kipper, a favourite article of diet, is given in the *Mirror*, x. 242. "Salmon are caught in less or greater abundance in all the rivers of this country (Dumbartonshire). The salmon fisheries of Loch Lomond and the Leven are of considerable value. In several parts of the county, salmon are cured in a peculiar manner called kippering, and throughout Scotland kippered salmon is a favourite dish. It is practised here in the following manner:—All the blood is taken from the fish immediately after it is killed: this is done by cutting the gills. It is then cut up the back on each side the bone, or chine as it is commonly called: the bone is taken out, but the tail, with two or three inches of the bone, is left; the head is cut off; all the entrails are taken out; but the skin of the belly is left uncut; the fish is then laid with the skin undermost on a board, and is well rubbed and covered over with a mixture of equal quantities of common salt and Jamaica pepper. Some of this mixture is carefully spread under the fins to prevent them from corrupting, which they sometimes do, especially if the weather is warm. A board with a large stone is sometimes laid upon the fish, with a view to make the salt penetrate more effectually. In some places, as Dumbarton, instead of a flat board a shallow wooden trough is used, by which means the brine is kept about the fish: sometimes two or three salmon are kippered together in the same vessel, one being laid upon the other. The fish, with the board or trough, is set in a cool place for two or three days; it is then removed from the board, and again rubbed with salt and pepper; after which it is hung up by the tail, and exposed to the rays of the sun or the heat of the fire. Care is previously taken to stretch out the fish by means of small sticks or hooks, placed across it from side to side: after it has remained in the heat a few days it is hung up in a dry place until used. Some people, in order to give the kipper a peculiar taste, highly relished by not a few, carefully smoke it with peat-reek or the reek of juniper bushes. This is commonly done by hanging it up so near a chimney in which peats or juniper bushes are burnt, as to receive the smoke; there it remains two or three weeks, by which time it generally acquires the required flavour."

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* Philosophical Magazine, l. 74.

A method of preserving fish without the aid of any antiseptic is practised in many countries, and is adequate and simple. The process merely consists in s
the fishes, and drying them in the sun or in
Flesh-meat may be similarly treated, and equally

preserved; or the heat of a fire will answer when strength of sun is not procurable. Mr. Hearne says, that meat which had been preserved by some North American Indians, by exposure to a hot fire until dry, was hard; and that other specimens dried at a slow fire, or in the sun's beams, was far superior.*

The substance called Pemecan, well known to our navigators, is prepared according to the principle of this process. Beef is cut into thin pieces, and dried in the smoke of wood: when quite friable, it is reduced to powder, and mixed with an equal quantity of melted suet into a substance, which, on cooling, becomes a solid mass.

The preservation of meat by the process of salting is that which is universally practised in the domestic economy of the British isles. Long as this method has been known, the mode of its operation has never been clearly explained; and Galen's theory seems as good as any that has been since adduced.† I believe the theory to be as follows:—When salt, in considerable quantity, is applied to extensive surfaces of the muscle of animals, the fibre in some time corrugates, shortens, and becomes more dense; the interstices are closed, and the watery juices which they contained are expelled; the salt dissolves in them, and forms brine. These watery juices in fresh meat greatly aid and hasten its decomposition; hence their expulsion is the first step towards preservation. The antiseptic tendency of the salt powerfully aids in the process; and the completion of it is the perfect exclusion of the atmosphere.

There are two simple experiments that prove the agency of water in a satisfactory manner. It is stated by Boerhaave, that a piece of flesh maintained in a heat equal to that of the human body will in a few days have undergone putrefaction; but that if the water be previously removed, the meat will grow hard, and may be kept for any number of years unaltered. If this hardened flesh be impregnated with water, it will speedily putrefy. The other experiment is one made by Sir John Pringle: he caused meat to be beaten up with water until the mixture had the consistence of pap; the result was, that the putrefaction of this mass was greatly accelerated.

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* Journey, 297

† See his book, on Food

Notwithstanding the tendency to putrefaction which the presence of water creates in animal matter, the exposure of muscular flesh to a great quantity of water has the opposite effect; the flesh is changed into a peculiar fatty matter, called *adipocere,* which resists putrefaction a long time.

Meat preserved by salt, as might be expected, becomes hard and ill-tasted if very long kept. But if it be withdrawn from the salt in a reasonable time, and the water entirely removed by drying the meat in the air, it will keep with much less injury. And if it be dried in the smoke of burning turf, peat, or wood, the vegetable tar and pyroligneous acid, generated by the combustion, will not only communicate an agreeable taste, but will considerably assist in its preservation. This mode of preserving is adopted in the case of hung-beef, bacon, hams, tongues, and various kinds of fish.

Smoked provisions are, however, apt to disagree with some persons; and there are instances of empyreuma even proving poisonous.

The antiseptic power of salt must appear to be a most fortunate property of that substance when we consider how great a relish mankind have had for it in all ages: "Can that which is unsavoury be eaten without salt; or is there any taste in the white of an egg." * Much better for us would it be to be deprived of all that remains of the tribe of condiments than this one. It should however be observed, that, according to the experiments of Sir John Pringle, salt, like sugar, is only an antiseptic in large quantities; he found that a small quantity, so far from preventing, promoted putrefaction. From this fact, the sagacious physician concluded, that as we use salt at table in small quantity only, its use is to help digestion by its septic power, the meat being thus softened and dissolved.*

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* Job, vi 6

It is not a matter of indifference what kind of salt is employed for curing meat and fish. Bay salt is preferred. This is in large crystals: it is obtained by spontaneous evaporation of salt water. The superiority of Dutch-cured herrings has been ascribed to the use of bay salt. Meat salters prefer this coarse-grained and evidently impure quality; and perhaps this very impurity adds to its antiseptic power. Different kinds of salt seem also to differ in their *degree of saltness*, as one sugar is sweeter than another. The crystals of salt which may be picked from a bottle of real Gorgona anchovies is most intensely saline, and the peculiar flavor of this favourite fish seems to be greatly aided by the piquancy of the salt. The fine-grained salt of Cheshire, commonly used in London, penetrates much sooner; and meat salted in London has more taste of the salt in four days than it acquires in Dublin in a week, on account of the coarse grain of the salt manufactured in the latter place.

The best mode of salting meat for long keeping is, perhaps, the following:—For this purpose, the meat ought to be of the best possible quality; for as the natural effect of the process is to deteriorate the meat, unless it was originally excellent a sufficiently good quality to render it agreeable will not remain. The main object to be kept in view ought to be to extract as much of the animal moisture as possible, with the least possible quantity of salt, and therefore with the least injury to the softness of the fibre. To effect this object with beef, select the meat perfectly free from taint; let all the kernels be cut out; sprinkle it all over with fine salt; lay it on an inclined plane for about six hours, so that its juices, which the salt will separate and dissolve in, may, as much as possible, drain off. Let it be then wiped, well rubbed with bay salt, and placed between two strong boards, with a very heavy weight on the upper one. The combined action of the salt and pressure will cause the extrusion of more juices. In twenty-four hours, let the meat be wiped and rubbed again, and laid under the pressing boards. The same wiping, salting, and pressing are to be repeated in twenty-four hours more. In this way, the weights being added to every day, the meat may be kept until it is salt enough for the purpose. The time will be shorter or longer according to the fancy of the consumer; but if the meat is to be kept for store, it must not be left exposed to the air between the boards more than a few days. After being removed from the pressing boards, the pieces must be packed closely in a perfectly tight cask, with salt between and around.

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* Philosophical Transactions, 1751

Instead of using salt alone, it may be mixed with one-eighth of its weight of saltpetre to redden the meat. If there be any advantage in sugar for preventing hardness, the quantity ought to be larger than what is usually employed; for, as already observed, a small quantity promotes putrefaction: the sugar ought not to be under one-third of the weight of the salt. M. Ude, in his directions for making hams, employs equal weights of sugar and salt: and others use twice as much sugar as salt.

In the *Journal des Connoissances Usuelles*, the following mode of making mutton-hams is given, and it perhaps might be followed with great advantage as a general process for preserving meat:—The mutton must be fat. Two ounces of sugar are to be mixed with one ounce of common salt, and half a spoonful of saltpetre. The meat is to be rubbed with this, and then placed in a tureen. It must be beaten and turned twice a day, during three consecutive days; and the scum which comes from the meat having been taken off it is to be wiped and again rubbed with the mixture of sugar, salt, and saltpetre, in the same proportions as before. The next day it should be again beaten, and the two operations ought to be repeated alternately during ten days, care being taken to turn the meat each time. It must be exposed to smoke for ten days. Hams thus prepared are generally eaten cold.* There can be little doubt that this mode of preserving, if applied generally, would be found an excellent one, and it will be readily admitted that any process which preserves meat with so small a quantity of salt is valuable.

It is a common opinion that salting greatly impairs the nutritiousness of meat; and, in proof, the fact is adduced, that all the juices of the flesh run out and form brine. I believe that the nutritive qualities are scarcely impaired by a few days salting, notwithstanding the great quantity of gravy-like juices which pour out. But there can be little doubt that the action of long-continued salt is to corrugate and harden the fibre, to render it somewhat less easily digestible, and probably to lessen its nutritiveness. Very little changes seem to take place in the meat beyond these; but that no argument ought to be founded on the abundant extrusion of gravy-like juices, the following experiment, which I made some years since, seems satisfactorily to show:—

Forty-two pounds and a half of best beef were well rubbed with salt in the usual manner, and put into a dry crock in the month of December: in twenty-four days, it was taken from the brine which had formed, and was suspended for some hours above the crock, in order that it might drain. The beef was found to weigh forty pounds, and the brine five pounds and a half. Evaporation had removed some of the water from the meat, and much of the salt had entered permanently into the interior. The whole of the brine was made to boil in a clean iron pan; and as fast as salt crystallised, it was skimmed from the top, and scraped from the bottom. When it was reduced to the measure of half a pint, it was allowed to cool. I judged that this should prove a very strong gravy, if any of the valuable parts of the meat had ever been contained in it; but on tasting it I could not perceive much difference between it and a saturated solution of salt in common water. The liquid was then evaporated to one-half, and on separating the salt, the taste was still as poor as ever. The proper conclusion seemed to be, that by the loss of these juices, when meat is subjected to the action of salt, very little if any of the nutritious portion is abstracted. The liquid consists merely of water, tinged with blood; and one use of the process is to expel from the meat this blood and water, which, if allowed to remain, would tend to promote its putrefaction.

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* Mirror, xiii 364

When meat has been too long kept in salt the taste becomes disagreeably saline, and recourse is had to the expedient of exposing the meat to the action of water. In the way that this is generally done, the process is totally inefficient, for the salt is retained with great obstinacy. I caused a rump of beef, which had been in salt for five weeks, during a cool summer, to be immersed in about three times its volume of cold water, for three hours. At the end of that time, the water did not taste in the least degree salt: it underwent the same process in new water; but, after two hours, the water had no taste. It was then boiled in water, sufficiently for the table; the water was scarcely salt; yet the beef was excessively so.

Led to suppose, from this experiment, that the salt actually enters into chemical combination with the meat, I tested the conjecture in the following manner:—From the same boiled salt beef, now cold, I cut two slices, each less than a quarter of an inch thick: one of these was kept for comparison, and the other was thrown into some cold water, and left there until next morning; it then was found totally deprived of all taste. Hence there was either no chemical combination, or a very weak one: and the reason of the failure of the common method of freshening oversalted meat clearly appears. The external portions defend the internal parts from the action of the water; and if the watering were renewed often enough to remove any salt from the central portions, the result would be, that the external parts must have been totally deprived of salt, which never happens. This only holds true when the meat is in tolerably large masses; and, under such circumstances, I imagine that the good housewife's process for remedying the ill effects of oversalting, by exposure to one or two waters, hot or cold, is a delusion: and that it is so even when washing with the hand is used; for the hand can only affect the mere exterior. The only alternative is to cut the piece into small portions; and every one knows that this injures the qualities of meat. Oversalting seems, therefore, to have no remedy.

All meats are not rendered equally salt or hard by exposure to the action of salt during the same time. Pork becomes much less salt than beef. For a comparison, I caused a lap of pork, and a lap of beef, to be salted as nearly as possible in the same manner. They were kept for three months; at the end of which time the pork was just as it ought to be, but the beef was to my taste uneatable, it had taken up so much of the salt. It is on this account that pork is preferred for sea voyages: it takes up less salt than other meats; and with that smaller portion it keeps as well.

I believe there is another reason. Pigs that are purchased for sea-store are never fed with the same care, abundance, and cleanliness, that those intended for home consumption are: bad feeding, filth, and ill usage are highly detrimental to pigs, their flesh proves soft, rank, and less agreeable. But such pork is liable to a much greater objection, — it is less wholesome; it is apt for a few hours to derange the digestive organs, and to produce considerable disturbance in weakly constitutions. I once paid great attention to this fact; it would be tedious to give details; but the result, on which I feel a good deal of reliance, is that such unwholesome pork is greatly improved by being kept a month in salt; and that it will be totally cured of all noxious quality if the time be extended to three months. These experiments were made in Ireland, where, owing to the poverty of the peasantry, the quality of the pork is generally inferior to what it is in England. Bad pork will, on the same principle, often make tolerable bacon; but so far only as salubrity is concerned. After six months, ordinary pork, if still kept in salt, generally begins to be too salt, and to acquire a new flavor not very agreeable, in which that of a bloated herring is sometimes distinguishable.

One reason that pork does not take up salt so speedily as other meats may be, that the ratio of fat to lean is far greater in pork than in any other meat. Now fat takes up salt much more slowly than the muscular parts of the animal. Every one must have observed that when a piece of meat has been exposed a long time to the action of salt, the lean will be uneatable when the fat will be but moderately salted. This, also, affords us the reason why pigs may be advantageously loaded with fat, as it is the custom to do, — a custom which is founded on observation of the natural tendency of that animal to corpulency. When a pig is thus fattened, it would be a very unprofitable kind of meat were it to be used in its fresh state, for the luscious fat would be unendurable. Instead of being thus used, it is put into salt, where its fatness prevents its too rapid absorption of saline particles: time may therefore be allowed until the hardening power of the salt has had full action on the fat. The latter is thus rendered firm and eatable, without being disgustful to the palate, or indigestible to the stomach; and it is not rendered unwholesomely or disagreeably salt. Thus all circumstances fortunately tend to one object, and hence salt pork is one of the most important articles in the whole catalogue of human sustenance. It must not be forgotten, also, that fats and oils have a less tendency to putrefaction: the oil is separated in a tolerably sweet state from the liver of the cod, by allowing that part to run into putrefaction. Tallow candles will keep many months without acquiring much ill odour.

It is a curious fact, and one that it is useful to be acquainted with, that the saltness of meat which had been preserved in brine, increases even after the meat has been removed from the brine. Thus if, in winter, a large piece of fresh beef be cut into equal parts of an equal quality, and both are immersed during the same length of time in the same brine, containing more salt than the water can hold dissolved, suppose for fourteen days, one of them, when dressed, will prove sufficiently salt to please many palates. Let the other, taken out of the brine at the same time, be set aside for six weeks, and it will be found on being duly boiled that it has grown by far more salt than the former, although apparently they were both exposed to the action of the salt during the same length of time.

It should always be kept in mind, that the true art of preserving meat by salting, is to do so with the smallest quantity of salt that can be made to answer the purpose.

It may be proper, however, here to observe, that many persons fail in preserving meat by using too little salt, the error arising from the vague notions which prevail with regard to the nature of brine. In many books, we find it given as quite a sufficient direction for the strength of brine, that it shall float an egg: there can be no worse hydrometer than this. It is very true that eggs are pretty nearly all of the same specific gravity. Out of twenty eggs, I found that ten of them were almost exactly of specific gravity 1·078; one was lighter, and all the rest a little heaver. Now a saturated solution of salt bears an egg, and a saturated solution, diluted with almost double its bulk of water, will do the same; hence the floating of an egg is a very vague test of strength. To obtain brine that will be of the same specific gravity as an average egg, a saturated solution of salt (at 65° of Fahrenheit), is to be mixed with exactly double its measure of common water at the same temperature. An egg put into this mixture will remain at the top, bottom, or middle; and the specific gravity of the mixture at 60°, is 1078. A saturated solution of salt will be formed by dissolving 7[illegible] ounces of salt in an imperial pint of water at 60°. (*Gay-Lussac.*)

"Brine should never be weaker than a saturated solution; and it will be always advisable that there shall be some undissolved salt present: for as meat is continually giving out its juices, up to a certain period, these juices would lower the strength of the brine below the preserving point. But if there be an excess of salt present it will dissolve in the juices given out, and thus the strength of the brine will be kept up.

The brine in which meat or fish has been cured, notwithstanding the antiseptic power of the salt, is very liable to putrefaction; for blood and all the liquid parts of an animal are more putrescent than the flesh. Mr. Ramsay, of Glasgow, has given an economical process for recovering it. Dilute the brine with water until its specific gravity is 1·16, then pour it into a clean cast-iron boiler; and, to two gallons and a half, add an egg previously beaten up along with two-thirds of an ounce of finely powdered charcoal: boil and skim off the impurities which will then collect. The liquid, on cooling, will be as colourless as water. Any fish or meat to be preserved by this recovered brine, must be sprinkled with salt.*

It is because salt is the most agreeable preservative of meat that it is used for this purpose, and by no means because it is the most effectual. According to the experiments of Sir John Pringle, it is the most feeble of all the substances tried by him. Saltpetre he found to possess no less than four times the preservative power of salt: on this account, and on account of the property which saltpetre possesses of giving a pleasing redness to beef, it is always an ingredient in the brine with which meat is preserved. Some suppose, however, that it has also the effect of hardening the fibre. Some other experiments of Sir John Pringle are more curious than useful; they add nothing to our means of preserving flesh, on account of the disagreeable taste of the substances employed. Thus sulphate of potash had twice the preservative power of common salt; sal-ammoniac three times; carbonate of ammonia, or of potash, four times; borax twelve times; succinic acid twenty times; and alum no less than thirty times. Perhaps some practical hints may be derived from the last-mentioned fact.

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* Edinburgh Philosophical Journal.

Of all the antiseptics tried, he found chamomile-flowers to be most powerful in its effects; and, on account of their bitter taste, we may add the least useful: he estimates the preservative power to be 120 times greater than that of salt. Nay, he found that meat, in which the putrefactive process had taken place, was restored by chamomile, and that it remained sound for a year after. Camphor seemed to have 300 times the power of salt. *

The agency of charcoal in removing the smell arising from incipient putrefaction, is well known; although the mode of applying it is generally very imperfect. In every process wherein charcoal is employed, it should be recollected that, in proportion as it has long been exposed to the air, its efficacy is impaired. The true mode of using it is to heat it red-hot immediately before using it; and, if it is intended to be employed for removing the taint of meat beginning to change, the charcoal, still red-hot from the fire, may be extinguished in the water which contains the meat, just as it is coming to a boil. It would be still more efficacious if the charcoal had been previously broken into bits the size of half a walnut, and these heated red-hot in an iron ladle. I have often succeeded, by this latter method, in recovering meat which without such a process would have been uneatable.

Mr. Parkes goes so far as to say, that mere contact is sufficient: — "Game, or any kind of animal food that has been overkept, will be rendered perfectly sweet and wholesome by covering it with a few pieces of fresh burnt charcoal." †

Dr. Thomson says, that if newly made charcoal be rolled up with clothes which have contracted a disagreeable smell, the odour is removed; so active is this substance.

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* Philosophical Transactions, 1750. † Essays, i 418

It is difficult to understand in what manner charcoal boiled with tainted meat can affect the interior. Salted meat does not give out its saltness to the action of the water in which it is boiled. From that circumstance it might be supposed that it would prove difficult to convey the influence of the charcoal to the centre of the meat through the external portions. Perhaps the circumstance suggests the propriety of cutting tainted meat into smaller portions, previously to their being boiled, than would have been deemed necessary had it remained sound.

Pliny says, that a little fried barley restores putrefied water: perhaps it is the carbonisation of the barley that is effective.

It is necessary to understand that the preservation of food, by the processes described in this chapter, is not to be considered merely a means of holding over provisions, without loss, until required for use; or of communicating to them a certain palatable flavour. The object is one of much greater importance: it is to preserve, as much as possible, the nutritiousness of food and its salubrity, and to prevent its doing actual injury to health: for it is a fact that meat and other articles of sustenance, in which spontaneous decomposition has commenced, are exceedingly dangerous to health, and have been sometimes known to act as poisons. In what manner this change is produced has never been distinctly shown: but it is easily intelligible, that as flesh contains the elements of some of the most deadly poisons that are found even in the vegetable kingdom, a slight change in their mode of combination or the ratio of their quantities may convert nutriment into a source of death, and that such a change during spontaneous decomposition is quite a possible event, although Providence has directed the operation of affinity in such a manner that it is a rare one. That it does sometimes happen is, however, proved by the following facts:—

Three persons in Paris had eaten pork purchased from a certain pork-butcher; two were seized with vomiting and violent diarrhœa: and the third, not of the same family, was also taken ill. On inquiry at the shop of the pork-butcher, some meat, such as had been purchased from him, was found. It was composed of several pieces cut from a preparation known in the pork trade by the name of Italian cheese, made of mixed fragments, strongly seasoned, and converted into a kind of compact pie Some pieces of this were covered with blue mould, and others with green. Analysis could not detect any mineral poison: but the marked alteration which the meat had undergone occasioned the accidents in question.

Dr. Paulus, of Saltz, had already related the history of seven persons who became violently ill after eating this Italian cheese, three of whom died. In 1824 a family at Paris were dangerously affected by eating a ham-pie, which was proved to contain no mineral poison, but which had suffered a commencement of the alteration in question.

MM. Lecanu, Labarraque, and Demorliere examined the upper and side crusts of a pie, containing veal and ham, which had undergone a considerable degree of decomposition. Analysis proved the absence of any mineral poison; but having been kept too long in a warm place, the pie had generated some peculiar poisonous substance which occasioned the serious illness of eight persons who had partaken of it.*

The following instance of the generation of deleterious matter is probably owing to the same cause:— Dr. Kerner has discovered that smoked or German sausages, a favourite food of the inhabitants of Wurtemburg, contain often a deadly poison. The effects of the poison are ordinarily manifested in spring time or in the month of April, in a manner more or less alarming. Some years since he published a number of observations on the subject; and stated, that out of seventy-six persons who fell sick from having eaten these sausages, thirty-seven died in a short time, while others remained valetudinarians for years. Liver sausages, he says, appeared to be the most dangerous. In general, he says, the poison is formed in raw, hashed, and seasoned flesh, after being stuffed into the intestinal membrane and smoked. This animal poison is distinguished from all others by this circumstance, that it does not attack the brain and spinal marrow, while it paralyses the whole lymphatic system. Sometimes the patient, for many months together, ceases to feel his heart beat, whilst the pulsation of the arteries remains invariable.*

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* Journal de Chimie Méd. 1832. Lancet, No 489.

Occurrences of a similar kind took place in London about twenty years since. A maker of what were sold as German sausages, residing in Clerkenwell, was brought before the Lord Mayor, charged with selling sausages of so bad a quality that many persons were taken ill, and one or two died. This led to an examination of the meat, and circumstances were elicited which occasioned the infliction of a heavy fine: but the precise nature of the deleterious agent was not ascertained, and many extravagant conjectures as to the spontaneous generation of prussic acid in the meat were afloat.

About ten years since, other persons were taken dangerously ill in consequence of eating these sausages; but nothing could be discovered as to the cause. The panic created by these accidents was however so great, as I am informed by a maker of these articles, that the sale of them in a few days might be said to be at an end. By greater care, and cautious examination of the meat, the *German* sausages made in London (as most of them are) now prove perfectly harmless, and are restored to public favour.

It is fearful to think that some of those mysterious deaths which have been attributed to poison purposely added to food, and for which persons have suffered death, may sometimes have been spontaneously generated in it in some such way as has been described by Dr. Kerner.

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* Philosophical Magazine, LVII 147

The virulence of the poison evolved during putrefaction is well shown in the case of persons who while engaged in the dissection of putrid human bodies have slightly wounded themselves, and have thus received the poison by inoculation: death has not only ensued, but it has been accompanied by the most violent and rapid symptoms. By inquiry amongst carrion butchers I find, that in skinning horses, they are subject sometimes to receive what they descriptively call poisoned-wounds: and a professional naturalist of London acquaints me that he has known dangerous inoculations to occur in the dissection of other species of mammalia.

A singular instance of the acrimonious and poisonous qualities putrescent of matter, and even its effluvia, is recorded. A person who died of dropsy was tapped a few hours after death; yet putrefaction had set in. The surgeon who operated was next night taken ill: he became restless and uneasy: next day he had slight tremors, and unusual lassitude: in three days, angry pustules arose on his hands where the least drop of the water fell: in some days after he had universal convulsions, and his life was for a long time in danger. Some of his assistants who merely remained in the room and never touched the water, were much disordered, and broke out with livid eruptions.*

It is well known that pestilential diseases have often arisen from the putrid exhalations of animals. The decay of a whale cast ashore at Egmont occasioned a malignant fever. Galen attributes the breaking out of plagues to unburied dead bodies after battles. The following fact is on record:—In 1783, M. Faure, of Narbonne, bought a house previously occupied as an anatomical hall, and employed three men to dig a cave in the cellar; in digging, they came to a place which had been the common receptacle of the remains of human subjects, and, on extracting a few stones, an offensive putrid matter rushed through and suffocated them. M. Faure, going to see the workmen, descended but two or three steps before he fell senseless. Of nine persons who entered to bring out the sufferers, six died. M. Faure died in four days. In the mean time the smell increased to such a degree as to create a pestilence, and the neighbours were obliged to remove, but a great many of them died. The cellar was obliged to be filled up, and the house closed.

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* Case of Mr. Cox, Philosophical Transactions, 1739

On the occasion of the removal of a very great number of human bodies from the ancient burying-place, Des Innocens, at Paris, some curious facts relative to the generation of a gaseous animal poison occurred, of a striking character: — M. Fourcroy, amongst others, was charged with directing the precautions requisite for securing the health of the workmen employed in removing the bodies. They informed him, that bodies interred do not perceptibly change colour for the first seven or eight days: that the putrid process disengages elastic fluid which inflates the abdomen, and at length bursts it: that this event instantly causes vertigo, faintness, and nausea in such persons as unfortunately are within a certain distance of the scene where it takes place: but that when the influence of its action is nearer, a sudden privation of sense, and frequently death, is the consequence. Nothing could induce these men to assist in collecting some of this pernicious vapour for examination.*

It is not in animal matter alone that a poisonous agent is generated by incipient decomposition; it has been found, that bread is liable to changes and conditions of a nature very detrimental to the human constitution. Some years since, a case of poisonous effects resulting from the eating of mouldy bread, occurred near London: — The symptoms produced were diarrhœa, vomiting, and tenderness of the abdomen. The loaf was yellow-coloured; it was sprinkled over with fungiform vegetations, black, yellow, and green: it was soft, wet, and inelastic; and so tough, that it could be drawn out into strings. It was proved that there was no metallic poison present: a piece of this bread, given to a dog and cat, produced bad effects analagous to those already mentioned. To ascertain if the mould was the poisonous agent, five grains of it were swallowed, but there was no bad effect; but a small bit of the bread eaten produced colic pains, and tendency to diarrhœa. An experiment was then made, with a view of proving whether, by the mere process of moulding, the poisonous agent could be generated at pleasure: with this view, a quantity of dough was allowed to become mouldy in a moist place; the mould was then carefully removed, and the dough baked into a loaf: this was found to have the same physical and poisonous qualities as the other bread; the gluten was proved to have undergone a marked alteration in its proportion.*

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* For a full account of this interesting subject, see Dr. Ure's Dictionary, Art *Adipocere*

There is something exceedingly curious in the effects which putrefaction produces on the people of different nations; some being unable to resist the slightest degree of it, and others perceiving no ill consequences from the use of provisions considerably advanced in that process. In Great Britain, a putrid egg is not only an object of the greatest disgust, but is ranked amongst the poisons: the smallest portion of it is said to be capable of producing considerable disturbance of the health: but the Tonquinese and Greenlanders do not hesitate to eat their eggs in any stage of putrescency. The Greenlanders frequently eat their fish absolutely putrid, and with as much relish and safety as we do our black sole, which two hours before had been alive. The Icelanders eat the flesh of the shark and sunfish, after it has been rendered tender by putrefaction. To some nations, indeed, the flavour of semi-putrid meat and fish is quite agreeable; but in the British isles, and most parts of Europe, nothing is more capable of injuring health than the use of tainted provisions; and there are not wanting instances of death resulting from the same cause.

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* Lancet, No 489

SECTION II.

NATURE AND OBJECTS OF THE CULINARY ART.

The various alimentary substances necessary to the existence of man are for the most part presented to us by nature in a state unfit for reception into the stomach. Although some nations have fed upon raw flesh, and devoured fish the moment it was taken out of the sea, it can scarcely be supposed that our preference to cooked animal food, and our disgust at it in its raw state, are the mere results of habit, and have no foundation in nature. What the intention of the Creator might have been in thus preventing man from satisfying his appetite as soon as it serves, by having recourse to flesh and fish without the delay and trouble of cooking, and to grain without grinding and making it into bread, is not obvious; but he would be a great miscalculator on the plan of creation, that would not admit some great, although recondite design, in this almost universally adopted provision.

By some strange misconception the business of cookery has, in all ages, been intrusted to ignorant persons, who practise it as an empyrical art without any reference to those general principles which connect it with chemistry as much as other arts are connected with it, and are but branches of it. The truth is, that no person wholly unacquainted with the rudiments of chemistry can be a cook, possessing the important attributes of rendering food wholesome as well as pleasing; converting to the purpose of sustenance every part of the materials entrusted to his care that is susceptible of being so applied; and preserving the nutritious qualities of all aliments in as great a degree as possible unimpaired. A person qualified in this way, administers to health, life, pleasure, and economy; and ought to occupy a very different station from the mere producer of various insidious poisons, which, while they please the palate, undermine the health, and squander property.

Many persons have affected to consider the cultivation of this art inconsistent with the well-being of man, its object being as they say sensuality, and its effects on society a prodigal expenditure of health, the most valuable of God's gifts. "Tum coquus vilissimum antiquis mancipum æstimatione et usu, in pretio esse; et quod ministerium fuerat, ars haberi, cœpta;"—"The cook, whom our forefathers reckoned the meanest slave, became now in high esteem and request; and what was formerly a servile employment, was now exalted into a science." —— "Cookery depopulates like a pestilence, because, when it becomes an art, it brings within the compass of one stomach what is sufficient for ten in days of temperance; and is so far worse than a pestilence, that the people never recruit again."—(*Lord Kames.*) May we not question whether the illustrious author of this severe and sweeping censure, pronounced it with his usual circumspection. Bad cookery may undoubtedly have this effect; but the object of legitimate and useful cookery is to promote health and comfort together, to prepare food in the most agreeable form that is compatible with the greatest possible development and preservation of nutritiveness. True cookery is an economical art, and tends to husband instead of exhaust the resources of a nation; hence the practice of it should be confided to persons only of competent attainments. Whoever takes the trouble to examine books written on cookery, will discover how ill qualified the authors generally were for the task by the incongruity of the ingredients used, and the ineffective or destructive processes to which they are subjected. He who rightly considers these matters, will probably be led to the conclusion, that the art of cookery can only be practised in perfection by persons whose education is very different from what we find possessed by cooks. Nay, some have been of opinion that the whole art of cookery is too extensive a subject to be rightly understood by one man. And Lord Kames has gone so far as to say, that to advance the luxury of the table to the acme of perfection, there should be a cook for every dish, as there was in ancient Egypt a physician for every disease.*

As to the sensual tendency of legitimate cookery, and its consequent effects on health, it may be asked in what way is food deteriorated by being made more agreeable by art than it is by nature? If it be answered, that thus prepared it leads to excessive indulgence, the fault lies in the indulger; and the same objection might be urged against any other source of enjoyment. If it be conceived that multiplied combinations of nutritious principles, excessive stimulus of condiments, or overpowering condensation of animal matter, are destructive to health; the injury is not attributable to the art but to the artist. These are the errors of pseudo-cookery, of an art unassisted by the lights of science, and generally under the direction of the most ignorant classes of society. When the delusion has passed away, which affects to suppose that to economise sustenance, to develop its maximum power of nutrition, to render it more than naturally agreeable, and to aid the stomach in assimilating it to the wants of the body, are merely sensual pursuits and beneath the dignity of science, then the art of philosophical cookery will be relieved from the stigma which has retarded its advancement, its real importance will be appreciated, and men of science will more generally apply themselves to its cultivation.

Dr. Goldsmith says, "eating is a pleasure of so low a kind, that none but such as are nearly allied to the quadruped desire its prolongation." Is there not here an affectation of exaltation of grade that does not belong to any man whose natural character has not been disguised by the insane whimsicalities of such pretenders as Antisthenes and Diogenes? If Dr. Goldsmith be right, the genuine human species seems not to be numerous, and most men are allied to the quadruped class. There can be no doubt that an excessive addiction to the pleasures of the table tends to the debasement of the mind, the injury of the body, and the waste of property:

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* Sketches of the History of Man, ii 103.

but to derive a reasonable gratification from a meal, cooked in an agreeable, simple, and wholesome manner, seems not only to be in no way derogatory to this assumed dignity of man, but to be a grateful recognition of the two-fold favour conferred on him by Providence, in giving him a good appetite, and the means of satisfying it.

The province of the cook was not in early times the servile office that it has been in later ages. In the days of the patriarchs, the preparation of food was not allotted to any particular person. In the time of Homer, Kings and Princes killed their own cattle, and cooked the flesh. Herodotus, alluding to the king of Lebæa, in Upper Macedonia, says, that "in ancient times even princes, and not merely the common people, were scanty in their possessions; and therefore the very wife of the king cooked the food of the family." And in modern times, Dr. Shaw, the traveller, reports the same custom amongst the states of Barbary: he says, that persons of the highest character perform what we should term menial employments. The greatest prince of these countries is not ashamed to fetch a lamb from his flock, and kill it; while the princess makes haste to prepare her fire and kettle, and then dresses it.

In the present condition of society, the process of rendering simple food tolerably wholesome, palatable and elegant, is so well known, and so generally practised, that it ceases to excite attention. Familiarised as we now are to the possession of adequate methods, we never reflect on the gradual and slow process by which they must have been introduced, the difficulties with which the original inventors had to contend, and the very inobvious nature of our refinements. When man first began to use animals for food, he, through necessity, made use of their flesh in its raw state; for the proper application of fire to the purpose of changing the properties of raw meat is a process which would not immediately suggest itself: even when it did, the want of culinary instruments had to be supplied; and those which presented themselves, while yet the arts were in their infancy, were clumsy and inconvenient. Herodotus gives us the following account of Scythian cookery: —"Having flayed the animal, they strip all the flesh from the bones, and put it into pots when they have them. In these they cook the flesh, burning the bones beneath the vessel; for the Scythian regions are utterly destitute of trees.* If they have not a pot, they inclose the flesh of the victim in the integuments of the belly, with water; and burn the bones underneath, which blaze, while the integuments easily contain the flesh freed from the bones. Thus the ox is made to cook himself; and other victims are served in the same manner."

The same rude mode of cookery has been found to be practised in modern times by various travellers and voyagers. In Schovten and Le Maire's Voyage round the World, it is stated, that in Horn Island the natives dressed hogs as follows. — The abdomen being opened and cleared of the intestines, hot stones were put in, and the hair being singed off, they were, without further preparation, served up to the table of the king. In Kolben's Voyage to the Cape of Good Hope, it is said, that, at the nuptial ceremonies of the Cape, the oxen are cut in many pieces, and the whole dressed; some being boiled, and the rest roasted in the following manner: — A large flat stone is fastened in the ground, in the manner of a hearth, and a brisk fire made upon it, which burns till the stone is thoroughly heated. The fire is then removed, the stone cleaned from the ashes, and the meat placed upon it. It is then covered with a flat stone as large as that upon which the meat lies: round which a fire is kindled as well as upon the upper stone, by which the meat is soon roasted or rather baked. Sir John Chardin found that the women of Mount Caucasus, bake their dough on round stones, about a foot in diameter, and hollowed two or three fingers deep. The stone being well heated they put the dough into it, and cover it with hot ashes and burning embers. In the Andaman isles, they broil their meat by throwing it on burning wood. Hearne describes the cooking-vessels of the North American Indians:—They construct a sort of basket of the rind of the birch tree, so closely joined that it is capable of containing water. They heat large stones, and throw them successively into the vessel containing the water, and the meat to be cooked, until the latter is sufficiently boiled. It is a clumsy contrivance, for the stones by being quenched in the water often break into small fragments and sand, and the meat is rendered gritty and disagreeable.* Mackenzie says, that the vessels in which certain North Americans cook their victuals are in the shape of a gourd, made of the divided roots of the spruce-fir, which they weave so compactly as to hold water; and this is made to boil with red-hot stones, as described already.†

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* Take the choice of the fl [illegible] and burn also the bones under it, and make it boil well, and let them [illegible] the bones of it therein. — Ezek. xxiv 4.

The introduction of various vessels of iron, tinned-copper, tinned-iron, brass, and silver, along with spits, and the various kinds of machinery used for turning them, and other roasting machines, have rendered modern cookery not only less troublesome, but far more effective. And the various kinds of fire-grates, ranges, hot-hearths, ovens, &c., have rendered the application of heat so manageable, that any degree of it may be applied with certainty. In former times, cookery was conducted on a much larger scale than at present: a whole boar, or a whole ox, was very common. In the time of the Anglo-Saxons, it was the practice to roast a whole ox; and, even in the time of King John of England, two furnaces were ordered for the royal kitchen, capable of roasting two or three oxen. It is certain that the flavour of the parts fit for roasting is improved by being not divided into small portions. The present custom of subdivision has other advantages besides mere convenience: for if a whole ox be roasted, there are many parts utterly spoiled by that process, which could have been turned to the best account had they been boiled. Sir John Chardin, at a dinner given him by a Mingrelian princess, was served with a whole hog, boiled: here was an analogous error, for some parts of the hog were equally spoiled, which, if roasted, would have been delicious. This wholesale cookery is very properly discontinued throughout the world in the present day.

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* Hearne's Journey, p 315.

† Mackenzie's Journal, p 37

The following is the opinion of a celebrated person on the use and abuse of cookery: —

"In the hands of an expert cook, alimentary substances are made almost entirely to change their nature; their form, consistence, odour, savour, colour, chemical composition, &c., every thing is so modified that it is often impossible for the most exquisite sense of taste to recognise the substance which makes up the basis of certain dishes. The greatest utility of the kitchen consists in making the food agreeable to the senses, and rendering it easy of digestion. But its perfection seldom stops here: frequently, among people advanced in civilisation, the object to which it aspires is to excite the appetite, to appease capricious palates, or to satisfy luxurious vanity. Then, far from cookery being a useful art, it becomes a real pestilence, carrying with it a train of diseases, and not unfrequently the premature death of many of its infatuated votaries.*

The influence of roasting and boiling in changing the qualities of substances, and to such an extent as to render innoxious that which was previously a poison, or injurious, is proved by the following striking instances: —

The root of the *arum maculatum*, or wake-robin, possesses so much acrimony, that a little of it chewed in the mouth will blister and take off the skin. Its burning taste often remains for two or three days. Previously to the introduction of starch into the laundry, the farina of this root was used, and, unless it had been well washed, it was sure to excoriate the hands. It has been used in medicine, and, except in small quantities, was deemed poisonous. Water or spirit distilled from it possesses no acrimony*; neither does its watery or spirituous extract, and in any of the processes by which these preparations are obtained the root is deprived of all its powers. Hence, whatever the acrimonious principle may be, it is not dissipated by boiling but decomposed and destroyed. By drying the root, or washing it after being grated down, the same effect nearly is produced. In some of the islands of Polynesia this root is cultivated as an article of food; for when boiled it not only becomes harmless, but agreeable and nutricious like the potato.

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* Majendie's Physiology

The potato itself is said to be not quite free from injurious qualities if eaten raw. Several of the species of solanum are poisonous.

The bitter cassava root, "when raw, is a most fatal poison to man and beast: but prepared by fire it is very safe, and the natural bread of the Indians, and several Europeans."* It is much cultivated in the West Indies and other places. The juice being pressed out from the grated root, a farinaceous matter remains, which, when made into dough and baked affords an excellent bread much used in various parts of the world. Even the poisonous juice by boiling becomes nutritious.

Dough made of wheaten flour is noxious, unless it has been well baked or boiled.

The seeds of the *palma christi*, from which castor oil is expre[illegible]d, are highly cathartic and acrimonious. They are very farinaceous, and by being boiled they become a harmless diet, as some report. Garlic, an highly acrimonious and strong smelling bulb, if exposed to heat sufficiently long-continued, loses both these qualities, and becomes mild. The onion similarly treated, either by direct fire or through the medium of water, suffers an analogous change. The bark of the mezereon shrub is so acrid that if applied to the surface of the body it raises a blister: yet the very moderate heat necessary for drying the bark deprives it of this property. Many other instances might be adduced.

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* Stedman's Narrative, i 389

SECTION III.

THEORY OF CERTAIN CULINARY PROCESSES.

In what we call a joint of meat we discover the following kinds of substance:— bone, flesh or muscle, fat, skin, tendon, ligament, and membrane.

Bone, which to the ordinary observer appears homogeneous, really consists of several ingredients, on the nature of which a few observations are necessary: it is composed of cartilage, gelatine, and an earthy substance, chiefly consisting of phosphate of lime. These three ingredients may be separately exhibited by the following process: — if bone be kept immersed for a length of time in muriatic acid, moderately diluted with water, it will be found that the gelatine and the earthy portion have been dissolved away: the bone preserves nearly its original shape, but it is much altered in appearance and qualities; it is now elastic, soft, and less opaque; and, in short, is *cartilage*— the substance commonly called gristle.

In order to obtain gelatine, bone taken from an old animal and unbroken is to be boiled for a long time in water, the water is to be boiled down so far that the residuum, on cooling, shall solidify; this mass is chiefly *gelatine*. If the bones were those of a young animal, and had been reduced to powder previously to their being boiled in water, the mass obtained by evaporation would contain both the cartilage and gelatine of the bone.

In order to separate the phosphate of lime, all that need be done is to digest the bone of an old animal in very dilute muriatic acid, and to add to the liquor thus obtained, after being filtered, some ammonia, which instantly renders the whole white and turbid. After a while a sediment falls, and this is the *phosphate of lime* which had given solidity to the bone, although now an impalpable powder: it is not however quite pure. This powder is insoluble in water; but the other ingredients, cartilage and gelatine, dissolve by mere boiling. Bone also contains some fat, and in the cylindrical hollows *marrow*.

Flesh or *muscle*, the most important of the proximate principles of animals, is, if recent, of a red colour. If flesh in thin slices be well washed in repeated quantities, first of cold and afterwards of hot water, it becomes white, and it is then more easy to perceive that it is composed of a congeries of threads or fibres, all adhering; from this circumstance it is in this state called *fibrin*. If the whole water used in the washing of the flesh be boiled for some time, strained, and then again boiled down until, on cooling, it becomes solid, the mass will contain gelatine, the same substance as is obtained from bone by the processes above mentioned. On the strainer will be found a darkish substance, or *scum* as it is called by cooks, which consists chiefly of two substances, one nearly identical with coagulated white of egg, and hence called *albumen*; and the other, the coagulated principles of blood, which need not be more particularly described. But the solid mass of gelatine, obtained in the manner just mentioned, contains another substance of the greatest importance, being that which may be denominated the *savoury principle* of animal food, it is the source of its odour, flavour, and of much of its nutritiveness. It is by chemists denominated *osmazome*, and is the principle which gives to well made soup its agreeable smell and taste, and above all that peculiar acidity which soup, to be good, cannot be without. It may be obtained separately in the form of a liquid, as thick as syrup; but it does not gelatinise, nor coagulate by heat. It has an acidulous taste, even when pure.

The thready matter of the muscle, after all these ingredients have been washed away, is, as already observed, called fibrin: it now has neither taste nor smell; is tough and elastic, and as food is greatly deteriorated. When perfectly dry it is hard and horny. From what has been stated, it is obvious how improper a practice it is to subject meat to such a process as slicing and rincing; much of its nutriment and flavour would thus be thrown away in the washings. Fibrin if much boiled in water is partly converted into gelatine; hence gelatine not only exists ready-formed in muscle, but may be even *generated* from it by long boiling. Thus muscle consists chiefly of fibrin, gelatine, albumen, coagulable principles of blood, and osmazome. It is not here necessary to advert to the fat, which is also present in it.

The muscles terminate in a silvery white substance, called *tendon;* this is merely a dense and peculiarly aggregated kind of gelatine If tendons be long boiled in water, they dissolve almost entirely, and the water becomes a solution of gelatine.

The bones are connected together in joints, by that powerfully strong, tough, and elastic matter called *ligament;* it also is for the most part composed of gelatine, and will afford it to water if boiled on it sufficiently long. The *skin* and *membranes* are of an analogous constitution, and afford gelatine in large quantities when boiled in water. Thus gelatine is an abundant ingredient in animal matter: when dissolved in water it forms that tremulous nutritious substance called *jelly*, which in various forms enters into almost every kind of animal food.

The real substances with which we have to do in preparing animal matter for the purpose of nutrition are therefore not bones, flesh, skin, tendons, ligaments, and membranes, but phosphate of lime, cartilage, gelatine, fibrin, albumen, fat, certain principles of the blood, and osmazome. Of these few animal ingredients, qualified by certain condiments, are composed the almost endless variety of dishes with which caprice and epicurism have loaded our tables. The phosphate of lime is of no use whatever as an article of food; the important alimentary principles are gelatine, albumen, fat, and osmazome. The cartilage and mere fibrin are much less useful.

We now proceed to the consideration of the fundaamental processes of all cookery, boiling, soup-making, roasting, frying, broiling, and baking; the object being to endeavour to elucidate the theoretical principles on which they are founded. A right understanding of this is most necessary for those who are anxious to become proficients in the practice of cookery.

BOILING. When meat is made to boil in water, several changes take place in proportion as its temperature rises. A portion of its juices mixes with the water, and some of its solids dissolve: the more oleaginous and fusible parts of the fat melt out, and the water becomes soup or broth more or less concentrated. Some principles hitherto liquid become solid. An alteration in the state of combination of the elements takes place, the result of which is that the meat loses its red colour, acquires a much more savoury taste and smell, becomes more firm and yet more digestible, and, from being fibrous, its grain is rendered short; from being soft and flabby, it acquires firmness and elasticity, so that in many cases, when cut, the parts instantly retract widely from each other. Much of its juices, which having found no issue during the boiling remained included, are found in the interior changed in taste and smell. The red colour, previously diffused through the solids and juices, is much diminished; and if the meat had been long exposed to the action of the heat, the red colour disappears entirely from both. The longer it has been subjected to the boiling temperature after a certain period, the more indigestible and the less sapid and succulent it becomes. The limit between these changes constitutes the period of sufficient boiling, and the determination of it constitutes no small part of the skill of the cook.

In order to boil meat to perfection, care must be taken that the heat shall not permeate it too rapidly; for heat too quickly supplied would render the muscular fibre at the outside parts tough, while this portion being now a much worse conductor of heat, would suffer still more, and would not transmit heat so readily to the interior; hence the central parts might perhaps be too rare, while the exterior would be overdone, sodden, and its flavour extracted to waste by the water. Hence slow boiling affords the most wholesome as well as palatable meat. It is best if boiled in much water, replaced by other hot water, as fast as it evaporates. As to time, the general rule is that each pound of meat will require boiling for a quarter of an hour, if the boiling has been rapid, or twenty minutes if slow, which latter is preferable: but there are many exceptions; pork and ham, for instance, require at least twenty minutes or more per pound, and bacon not less than twenty-five. Cartilaginous parts require more boiling than fleshy parts.

SOUP-MAKING. The changes which flesh experiences during ebullition in water, have been described so far as relates to the mere cooking of meat by boiling. But the substances which the water takes up during the process are of great consequence in an alimentary point of view, and are liable to changes which it is proper to guard against.

When a joint of meat is boiled in water, it first loses the flaccidity natural to it, and becomes short-grained and harder. If the boiling be continued, the meat soon begins to soften: the muscular fibres then separate from their adhesions, and at length disintegrate into separate bundles, which continue to diminish until the whole mass is thus broken down into shreds, or masses so soft that they easily fall into shreds when handled. The meat has now lost almost the whole of its nutritious and agreeable qualities, and the water has acquired them in a great degree; some however is lost. A small quantity of the fibrin of the muscle has dissolved: so has the gelatine. The tendons, ligaments, membranes, and skin all dissolve more or less completely. The bones are deprived of their cartilage and gelatine. The albumen and fibrin of the blood solidify, and form that scum which floats, and which cooks are solicitous constantly to remove, although it can have no worse effect than to offend the eye. But, above all, the flavouring principle, the osmazome, dissolves with facility. The fat completely melts out and swims on the surface.

In proportion as the boiling has been long continued, the flavour of the liquor deteriorates; the common practice of forming soup by boiling large masses of meat until its structure is broken down into shreds is therefore decidedly bad, and tends to impart a certain degree of bitter empyreuma, or burnt flavour, which a nice palate is sure to discover, notwithstanding the laboured disguise of various condiments, and the intermixed effects of the principles dissolved away from the meat.

It may be received as a maxim which always applies, that the shorter the duration of the boiling, the better will be the soup, provided that the necessary principles have been extracted from the meat without loss or detrimental change. This object can be accomplished by previously cutting the meat into bits about the size of hazel-nuts: meat thus minutely divided will, when slowly boiled in the requisite quantity of water, give out all its desirable principles in the space of half an hour, or even less; more should certainly be not allowed, if delicacy of flavor be an object, as well as strength of nutriment. If greater delicacy be required, as for the sick or convalescent, twenty minutes will be found sufficient.

The rapidity of the boiling is not a matter of indifference. Whoever has been suddenly assailed in the street by the savoury steams which emanate abundantly from houses of entertainment, must have felt convinced of the great loss which the soups were enduring owing to causes which in a great measure can be prevented. The truth is, that some of the principles given out by meat to water are very volatile, and will be sure to escape, and be thus wastefully dissipated, if the boiling be rapid The temperature of 210°, that is, two degrees under the boiling point, is quite sufficient; and not only is this the case, but anything higher is mischievous, especially if maintained for a long time, and transmitted with rapidity. for beside the certain loss of the odorous principles there is an internal decomposition of the dissolved animal matter going on all the time, as appears from the fact that it is possible to boil good soup until it has lost all its excellence of flavour, and has become very much the reverse of agreeable.

This internal decomposition will take place the more certainly if the boiling be conducted with contact of air. The vessel should be kept closely covered, but of course not so closely as to endanger its bursting, as might happen were the temperature to rise, and were steam formed with greater rapidity than it could be emitted. Moderate closeness of the cover will suffice; and the contact of fresh supplies of air will thus be prevented as much as is necessary.

A different practice from this is sometimes had recourse to, when nutriment only and not flavour is the object. Papin's digester is a boiler close every where except a small hole at top, loaded with a valve which prevents the bursting of the vessel by opening whenever the pressure of steam arising from a temperature elevated above 212° becomes dangerous. This digester is intended for the extraction of nutriment from bones. the gelatine, and cartilage, and fat are thus extracted by the water, at a temperature much above 212°, from the phosphate of lime: but the taste of soup thus made is often both empyreumatic and ammoniacal.

Indeed, not only are the gelatine, cartilage, and fat extracted from the bones, but some of the phosphate of lime itself is boiled out, and imparts a certain whiteness and earthiness of taste to the soup. In all cases when bones have been subjected to long boiling, even though there was no increase of temperature beyond 212°, the same whiteness and earthy taste are discoverable. Hence, in the preparation of superior soups, bones, as contributing nothing which meat cannot better supply, ought to be excluded, if the boiling is to be long continued.

There is no doubt that bones do impart to water during long boiling a considerable quantity of cartilage and gelatine: the solution becomes so strong of them that, on cooling, it forms a tremulous jelly; and hence such soup has been supposed to be highly nutritious. I believe that it is very inferior in point of nutritiousness to soup made from so small a quantity of meat as will not impart any gelatinising quality. The property of becoming gelatinous has been often considered as a sufficient test of nutritiousness, and by persons from whom better information might be expected. Parchment and leather, if boiled sufficiently in water, will afford a very strong jelly: yet no one imagines that such jelly would form the basis of a good soup. Isinglass, certain kinds of sea weed, and Iceland moss, will all communicate the quality of becoming gelatinous to water; yet it is pretty well known that they will support life for a very short time compared with the efficacy in this respect even of beef-tea so weak that when cold it remains just as thin as the water that constitutes its basis. In the same manner veal broth will gelatinise in cold weather when it has not half the strength or nutritiveness of soup made from beef which remains permanently liquid.

The gelatine of bones, as an article of diet, is however by no means to be neglected, as under proper management it may be made an useful auxiliary to inferior soups. It does not appear that the digester of Papin affords an advisable method of extracting it; and of the truth of this opinion the following experiment made by Mr. Boyle will be sufficient proof, although the object of the experiment was not to extract the gelatine but to show that bones might be boiled to softness and used as food:—Mr. Boyle included a cow-heel, without water, in a digester screwed down, and placed the whole in a balneum mariæ, also screwed down, so that no steam could escape: the vessels were left for upwards of four hours on a moderate fire. ' The flesh was found to be well-boiled, and the bones so *soft that they could be cut with a knife and eaten.* He repeated the experiment with a new cow-heel, but left it on the fire for twelve hours: the flesh (though surrounded by the water of the balneum mariæ secured in the outer digester) had contracted a very empyreumatic taste and smell. The juice of the cow-heel in the first experiment concreted into a very firm jelly, but in the latter trial it did not concrete at all, and hence was chemically altered. Mr. Boyle observes that bones and hard tendons daily thrown away as unprofitable, may be converted into good nourishment; it is doubtful, however, that such can be *good* nourishment, although it may be of some use.

A fish treated in the same manner as the cow-heel in all respects, except that it was kept on the fire for two hours only, had when taken out a very good taste, and its bones were so soft that they yielded to the pressure of the finger, and the head might be eaten like its flesh.*

The extraction of the soluble matter of bone is performed in a very elegant manner by the process of M. Darcet. The bones are first boiled for some hours to extract the fat. they are then digested in very diluted muriatic acid until the whole of the phosphate of lime or earthy basis of the bone is dissolved away. The cartilage and much of the gelatine remain in the form of a flexible semi-transparent substance, retaining the original form of the bone. These masses are to be repeatedly washed with water, at length with water holding a little carbonate of soda in solution, and finally with pure water again, so that all traces of muriatic acid shall be removed. They are then to be dried in basket-work, and preserved in bags kept dry.

When some of this mixed cartilage and gelatine is thrown into water it absorbs 58 per cent., and swells. When 2½ parts are boiled in 100 of water they dissolve, and the solution on cooling forms a jelly. By evaporating this jelly, it at length thickens, and may be cut into squares, which will harden on cooling. This portable soup, if re-dissolved and seasoned, will answer as nourishment when better is not procurable. Prepared gelatine forms an excellent glue for carpenters and hatters. From it may be made those transparent sheets used for tracing drawings, and a variety of useful articles.

* Shaw's Boyle, ii 65

When aromatic condiments, such as spices and herbs, are used to flavour soups, they should be added a few minutes before the boiling is to be discontinued: for if much earlier, it will certainly happen that much of the aroma will be dissipated.

ROASTING. When meat is exposed to the more direct action of fire, without any intervening medium, some of the more easily fusible parts of the fat run out; much of the watery portion is evaporated from the hot surface; and the more freely this watery vapour is carried off, by a moderate but not too great circulation of air round the joint, the more the flesh loses the characteristic flavour of boiled or sodden meat, and acquires a new one. In proportion as the water is thus expelled, the temperature rises above what it could attain were the meat kept boiling in water. As the heat rises, a change in the mode of combination of the elements takes place in a still greater degree than if the meat were merely boiled. A decided decomposition at length becomes manifest, for the surface begins to be browned, which is the commencement of carbonisation, and some compounds are formed which have a much higher degree of taste than can ever result from boiling. If the heat be brisk, and a sufficient but not too great current of air plays round the meat, the interior will acquire a greater degree of sapidity at the same time that it remains tender, while the outside becomes brown, crisp, and somewhat pungent in flavour and smell, just in the same manner as a new taste is developed in many other substances by the application of a decomposing temperature.

The free escape of watery vapour is necessary to the production of the full effects of roasting: if it be prevented from escaping freely, even though the temperature be sufficient to brown the outside, there will be a softness and flaccidity within, which constitutes the peculiar characteristic of baking. Yet baked meat, even with this peculiarity of being sodden, is a favourite with many. The observation is well known to apply to the dressing of a beef-steak: most people prefer it when broiled on a gridiron over the naked fire to the mode of frying in a pan, where, there being little escape for its juices, owing to the contact of the heated surface with the pan, it is partly roasted and partly baked. During the latter process, were it covered its flavour would on the same account be still more impaired: and on the other hand, if contrivances be adopted for withdrawing the gravy so that the temperature of the pan may rise much above 212°, the flavour comes very near to that resulting from broiling. The reason that brownness ever results from pan dressing, where watery juices are present, is that there is also a considerable admixture of fat: for although a mixture of much water and little fat boils at 212°, a mixture of much fat and little water elevates the boiling point so high that the browning of the meat will take place, and will be greatly assisted by the difficulty which the watery vapour experiences in escaping between the metallic surface and the meat.

During roasting, much more of the fat is melted out than in boiling; for the cellular substance which contains it suffers considerable contraction at a high heat: this shrinking therefore expels the fat just at the moment that, being melted into a perfect liquid by so high a heat, it is in a condition to run out by any open channel. The heat of boiling water is insufficient to produce these changes.

Although the free evaporation of water from the surface of roasting meat is necessary to produce flavour, it is by no means advisable that this should take place too rapidly or to too great an extent; for then the temperature would ultimately rise to such a height that the meat would inevitably burn, and become hard and tasteless. In order to moderate the evaporation, the cook, acting on truly philosophical principles, bastes the meat with the liquid fat which has run from it; by doing so the assumption of the vaporific form by the juices is partially prevented; for it is the vapour which produces the ill effect, whatever that may be, on the meat, and not the liquid which produced the vapour.

Meanwhile the surface of the meat being now covered, owing to the basting, by a mixture of much fat with little watery juice, the temperature rises, in conformity with the principle already explained, to a browning heat only, which could not have happened had the ratio of the fat to the water been reversed. Vapour effects a variety of changes in animal and vegetable substances which the same vapour condensed into boiling water is incapable of.

During the roasting of meat, there is a continual evaporation of water to a considerable amount, as has been already explained. In proportion as it evaporates, the temperature rises, because the ratio of solid unevaporable animal matter is continually increasing · and at length, all the redundant water being expelled, the temperature has risen to such a degree, that a very slight increase of the power of the fire is capable of charring or browning the surface. At this time the meat is sufficiently roasted, and if the heat be continued, a new change begins to take place: the fibre loses its firmness and elasticity; it becomes soft and glutinous, for in fact its conversion into gelatine by its own juices has commenced: the mass shrinks, and in so doing begins mechanically to squeeze out a rich juice from all parts, on the presence of which diffused throughout the muscles depends in a certain degree not only the flavour but the richness and some of the nutritiousness of the meat. This juice is of a deep brown colour, it sometimes gelatinises on cooling; because it has dissolved away some gelatine: its taste is highly animalised. Yet it is not in its own nature so strong and nutritious as might be supposed: it is only when properly diffused throughout the flesh that it becomes of such importance; for its presence is indicative of such a condition of the flesh as renders it easily assimilable and agreeable to the taste. When this juice or gravy is extruded, the fact is indicative of a bad condition of the meat, and it is in this way rather than in the loss of the juice that the chief injury is done.

The extrusion of the juice is not always the consequence of too long a continuation of a high temperature; it is sometimes prematurely produced on certain qualities of meat, by such a degree and duration of heat as would not with other qualities have had any such effect. For instance, old wedder mutton will only discharge its gravy when it begins to be over-roasted: but old ewe-mutton will do so whether it is over-roasted or not. When it is observed that the fat and the gravy have both left the meat, it may be inferred that the meat was bad, provided it has not been over-roasted. When it has been over-roasted the gravy is always seen oozing, and the more abundantly if punctures have been made in the meat, a practice ever to be avoided.

The effect of heat in creating a taste quite different from that of the original substance is curious. Beside the instance of meats we have many others; — coffee is one; but perhaps the most remarkable is the case of mushrooms, which, when raw, have almost no taste, but by mere roasting become so exceedingly savoury.

It is stated in Forsyth's Dictionary of Diet, that the fire at which meat is to be roasted should be brisk enough to half char the surface, in order to prevent the escape of juices. but this observation requires modification; and Dr. Kitchiner justly remarks, that *early* scorching will prevent the fire from penetrating, and the meat will appear done when little more than half done. The brisk fire should therefore be only employed when the meat is half roasted.

From all that has been said, it appears that between the results of roasting and boiling, there are some important differences. During the former, water is evaporated in abundance, and it carries off with it a small quantity of odorous and volatile matter of little value: the other juices remain in the meat, unless it is overdone. But in boiling, some of the richest and most sapid juices and soluble matters of the meat leave it and mix with the water, where it is generally lost. These considerations would lead one to suppose that roast meat must be more nutritious and palatable than boiled meat: but on this subject every one must judge for himself. Which of the two is more economical remains yet to be discussed.

FRYING is a process essentially different from roasting or broiling: the following seems to be the theory of its operation —Water, as every one knows, when subjected to the action of heat, gradually rises in temperature, until a thermometer plunged in it attains 212°. After this period, further additions of heat only cause it to evaporate, without elevating the temperature. If oil or fat of any kind be similarly treated, the increase of temperature will not stop at 212°, but will proceed to about 600°, and then will remain nearly stationary, because it will boil and begin to be decomposed. If a mixture of water and oil or fat be heated, the maximum temperature will vary with the ratio of the two substances: if the ratio of the water be great, the temperature will be very little above 212°, if the ratio of the fat be great, the temperature will be little under 600°, and by proper proportions almost any intermediate degree may be maintained, provided that the two liquids be kept continually and perfectly mixed. When hog's lard, for instance, fresh from the animal, is heated, it first melts; its temperature rises until it arrives at about 212°, it then crackles, sputters, boils, and its temperature remains nearly stationary: for at this period, some water which the lard contained is constantly assuming the form of vapour, and by bursting off in steam bubbles, under a little pressure from the column of melted lard, it causes slight explosions. After the crackling has continued a short time it will diminish, the temperature will begin to rise rapidly; and when the noise will have entirely ceased, the heat will have risen to about 350°, for the water is all evaporated; and in some time it will attain 600°: but were the heat continued at this degree the fat would soon begin to be decomposed; it would become brown; inflammable gas would at length be discharged, and charcoal would be evolved.

The crackling noise which accompanies the frying of meat in a pan is produced by the explosions of steam formed in fat, the temperature of which is much above 212°. While the quantity of water in the surface of the meat is considerable, the latter cannot brown, because the resulting temperature is too low to carbonise or scorch it. This is the reason, that when the *despatcher* is used, the meat being covered, its surface is not browned; for the water cannot evaporate freely, and the temperature remains too low: hence covering should always be avoided in frying. Hence also the reason that watery meats do not fry well, for before all the water is evaporated the meat is sodden, and it is overdone by the time that the temperature has risen sufficiently to produce brownness. This again is the reason that in order to succeed well in frying fish, the fat in which it is put down should be full 600°, and the fish well dried with a cloth, as otherwise the temperature will fall so much, owing to the generation of steam, that the fish will be rather boiled and sodden in its own steam, than browned in the manner characteristic of frying. On the same account, agitation and frequent turning should be resorted to during frying; for the more speedily the water is evaporated, the more lively will be the taste of the article fried, the more quickly will it be permeated by the heat, and the less freely will any volatile flavour be dissipated.

Broiling. Between broiling and roasting the chief difference is in the temperature. In roasting, the heat is moderate, and slow in penetrating. in broiling, it is brisk and rapid. The difference of effect is, that the strong quick heat, by producing a greater degree of change in the affinities which maintained the constitution of the raw meat, generates a greater degree of sapidity,—a higher flavour; in the same way that a still higher temperature would produce empyreuma. Examples of the production of taste and smell from insipid substances have already been given. In point of fact, broiled meat is more sapid than roasted; but as to the agreeableness of that increased sapidity every one will judge for himself.

Although the temperature at which broiling takes place is so much higher than that at which roasting is conducted, it by no means follows that the quantity of water evaporated from the juices is greater, or that the meat should become more dry on that account. The surface undergoes decomposition, it becomes partially charred, and a dark-coloured crust appears. This crust retards evaporation, the juices remain little altered, and the meat, if skilfully broiled, retains every thing that is desirable in its constitution it may be as tender and juicy as roasted meat, and it will be probably more sapid. In point of salubrity, I believe it is not questioned that broiled meat stands second to none.

Baking. That there is a difference between the taste of baked meat and that of every other is certain, but it is difficult to say on what cause the difference mainly depends. There is one obvious cause; in baking there is not that free circulation of air round the meat which there is in roasting and broiling, and even in frying; the vapours are therefore not carried off so rapidly, and the meat is cooked in a way intermediate between boiling and roasting · it is soft and flaccid. It is, in short, partly boiled in its own confined water, and partly roasted by the dry hot air of the oven. More fat is also retained by the flesh, and on this account delicate persons are less partial to baked meat.

CHAP. V.

LOSS OF WEIGHT WHICH ANIMAL FOOD SUSTAINS IN ROASTING AND BOILING.

The quantity of real solid matter in a given portion of flesh is smaller than would be inferred from inspection: water is by far the most abundant constituent. I am not aware that any estimate has been published of the ratio found in butchers' meat except one, and on this I do not rely: we however have the estimate of M. Chaussier, who made an experiment on a human body; and there is no reason to doubt that his result applies with tolerable accuracy to the lower animals. M. Chaussier dried a human body in an oven, the original weight of which was 120 pounds: when dry it was reduced to 12 pounds. Hence the solid matter of the body was to the water as 9 to 1, or one-tenth. Bodies which have been buried in the burning sands of Arabia, or the mummies taken from ancient catacombs, have always proved exceedingly light.

It has been already shown, that in whatever manner meat is cooked there is a considerable diminution of substance, the loss consisting chiefly of water, juices, soluble matter, and fat.

In an economical point of view, a comparison of the loss incurred in the two most usually employed processes, roasting and boiling, is interesting, yet has not occupied the attention of the public as much as the importance of the subject seems to demand.

Professor Wallace, of Edinburgh, has given us the results of some experiments made to determine the loss which meat undergoes in cooking. It is to be regretted that it is not more in detail, and that the weight of the bone in each joint was not ascertained, but still it is of great value. The results, reduced to 100 pounds of meat, are as follow: —

	lbs
100 pounds of beef lost in boiling - -	26½
100 pounds of beef lost in roasting - -	32
100 pounds of beef lost in baking - -	30
100 pounds of legs of mutton, averaging about 9½ pounds each, lost in boiling - -	21⅓
100 pounds of shoulders of mutton, averaging 10 pounds each, lost in roasting - -	31⅓
100 pounds of loins of mutton, averaging 8 pounds 12 ounces each, lost in roasting	35½
100 pounds of necks of mutton, averaging 10 pounds each, lost in roasting - - -	32⅓

Thus the loss in boiling beef or mutton was less than in roasting. And it appears that meat loses by the cooking about one-fifth to one-third

A few years since, I undertook the superintendence of some experiments of the same tendency, with the view of inserting the results in this volume. These trials were made on several parts of the different animals, with as much attention to accuracy as the nature of the subject permitted. They were made on different qualities of the same kind of meat, at various seasons, both in England and Ireland. Such experiments are exceedingly troublesome, and occasion no small inconvenience: it is therefore the less surprising that the subject has been so little investigated; and the following results, in the absence of any others so particularly detailed, will perhaps prove interesting Allowance must be made for the nature of such processes, as the difficulty of fixing an average price of meat, fish. and poultry, owing to variations occasioned by the supply and the season, the want of uniformity in the prices of the city, and by the exorbitant demands of some venders of these articles. The degree of fatness was in all cases brought to a standard by cutting off all excess, and leaving the meat in a proper state for housekeepers' use. The meat was in all cases cooked as nearly as possible to the same degree, and the weights were determined with exactness. avoirdupois weight throughout is intended. The bones were entirely stripped of their meat previously to their being weighed. The only cost taken into account is that of the meat, leaving out fuel, &c.

Experiment 1.—A piece of beef, roasted. It consisted of four of the longest ribs, and was not remarkably fat; its weight was $11\frac{1}{16}$ lb. During the process of roasting it lost 2lb. 6oz., of which 10oz. were fat, and 28oz. were water dissipated by evaporation. When the meat was dissected off with the utmost care, the bones weighed 16 oz. Hence the weight of meat, properly roasted and fit for the table, was but

7lb. 11oz., out of $11\frac{1}{10}$lb. originally submitted to experiment. This beef would cost in London 8½*d.* per lb. The roasted beef cost, therefore, $12\frac{1}{5}$*d.* per lb. In another trial, a piece of beef of the same description, the tops of the ribs having been rejected with their meat, was submitted to the same mode of trial, the weight of bone in 10¾lb. was 16oz., and the fat 11oz.; which agrees with the former estimate.

Experiment 2. A piece of beef, consisting of five of the short ribs, tops not removed, not so fat as the last, was duly roasted, its weight being 13lbs. 12oz. When the flesh was accurately dissected away, the weight of bone was 16oz.; the loss during roasting was 1lb. 11oz., of which 8oz. were fat, and 19oz. water evaporated from the juices. The meat weighed therefore 11lbs. 1oz.; and, at 8½*d.* per lb. butcher's price, the roasted meat on the table amounted to 10½*d.* per lb.

Experiment 3. A similar piece of beef, consisting of short ribs, tops not removed, not very fat, weighing 12¾lb., was sufficiently roasted: the weight of bone was 17oz.; the loss by roasting was 35oz. of which 8oz. were fat, and 27oz. water. The weight of meat on the table was therefore 9lb. 8oz. hence, if the butcher's price was 8½*d.* per lb., the roasted meat on the table cost $11\frac{4}{10}$*d.* per lb.

Experiment 4. Ribs of beef, the tops cut off, weighing 14lb 6oz., fatter than the last, were duly roasted. The bone weighed 17½oz., the loss by roasting was 48oz., of which 21½oz. were fat, and 26½ were water in vapour. The meat therefore, when fit for the table, amounted to 10lb 4½oz., and its cost to $11\frac{8}{10}$*d* per lb., if the original meat was 8½*d.*

Experiment 5. A similar piece of rib, weighing 10¾lb., was roasted. The bone weighed 17oz., the loss amounted to 33oz., of which 14oz. were fat, and 19oz. were water. The meat roasted and fit for table amounted to 7lb 10oz., and its cost was $11\frac{9}{10}$ *d.* per lb., the butcher's price being 8½*d.*

Experiment 6. Part of a sirloin, the fleshy extremity of the two ribs being cut off to half their length, weighing 10¼ lb., was roasted. The bone weighed 22 oz.; the loss by roasting was 35 oz., of which 8 oz. were fat, and 27 oz. water. The amount of roasted meat fit for table was therefore 7 lb. 3 oz., and its cost $12\frac{8}{10}$*d.* per lb., the original price being 8½*d.*

Experiment 7. Part of a sirloin, weighing 14 lb. 11 oz. when roasted, gave of bone 2 lb. 8 oz; the loss was 39 oz., of which 11 oz. were fat, and 28 oz. water. The weight of roasted meat was therefore 9 lb. 11 oz., and its cost was $13\frac{2}{10}$*d.* per lb., at 8½*d.* butcher's price.

Experiment 8. Part of a sirloin, containing one rib only, and weighing 12 lb. 10 oz., was roasted. The bones weighed 30 oz.; the loss by roasting was 42½ oz., of which 16½ oz. were fat, and 26 oz. water. The roasted meat therefore weighed 8 lb 2 oz., and it cost 1*s.* 1*d.* per lb, at 8½*d.* butcher's price.

Experiment 9. Part of a sirloin, farthest from the chump, the top of the rib cut off, weighing 9¼ lb, lost in roasting 1 lb. 12 oz., of which 4 oz. were fat, and 24 oz. evaporated water. The bones weighed 19½ oz., and the meat 6¼ lb.: hence the roasted meat on the table cost 12¼*d.* per lb, the butcher's price being 8½*d.*

Experiment 10. Part of a sirloin, weighing 12 lb., lost in roasting 44 oz., of which 27 oz were water, and 17 oz. fat. The bones amounted to 2 lb, and the flesh to 7¼ lb. hence the roasted meat cost 1*s.* 2*d.* per lb., the original price being 8½*d.*

Experiment 11. Part of a sirloin, weighing 13 lb., when roasted was found to have lost 2¼ lb The bone weighed 42 oz., the meat weighed 8¼ lb. Cost of the roasted meat, 1*s.* 1½ per lb., the original price being 8½*d.*

The next experiments were made on salted beef, which being boiled, the weight of the fat melted out could not be determined.

Experiment 12. Part of a brisket, about 12 days in salt, weighing 11 lb., was duly boiled. The bone weighed 21½ oz; the loss in boiling, owing to the extraction of fat and juices, amounted to 33 oz.; the flesh therefore amounted to 7 lb. 9½ oz. This part of the beef generally sells in London at 6*d.* per lb.: the cost of the meat on the table is therefore 8¾*d.* per lb.

Experiment 13. A brisket of salted beef, all the coarse end being rejected, weighing 15¼ lb., when sufficiently boiled was found to have lost 3¾ lb. The bones weighed 1¼ lb.; the meat weighed 10¼ lb. If the butcher's price be taken at 6*d*, the boiled meat amounts to 9*d.* per lb.

Experiment 14. Part of a flank of beef, weighing 10 lb., being boiled, the bone weighed 8 oz.; the loss was 23 oz., and the meat 8 lb. 1 oz.. the cost was 7½*d.* per lb, if the butcher's price be 6*d.*

Experiment 15. Another piece of flank, weighing 5 lb. 2 oz., when boiled gave 10 oz. of bone; the loss was 9 oz.: the meat was 3 lb. 11 oz., the cost 8*d.* per lb, the original price being 6*d.*

Experiment 16. A tail-end of a rump of beef, weighing 12¾ lb., when boiled gave 1¾ lb. of bone; the loss was 1¾ lb.: the meat was 9 lb. 4 oz., and its cost 9¾*d.* per lb., the butcher's price being 7*d.*

The following trials were made with mutton.

Experiment 17. A leg of mutton *, weighing 9¼ lb, when boiled gave 1 lb. of bone, shank included; it lost in the boiling 1 lb. 2 oz.: the meat weighed 7 lb. 2 oz. If the butcher's price was 8*d.* per lb, the meat cost about 10¼d. per lb.

Experiment 18. A similar leg, weighing 9 lb 6 oz., afforded 15 oz. of bone, and lost 12 oz. in the boiling: the meat weighed 7 lbs. 11 oz. At 8*d.* per lb., butcher's price, the boiled meat would cost 9¾*d.* per lb.

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* It is to be observed, that in all these trials made on legs of mutton the laps had been removed, as is always done by the butchers in London, although almost never in Dublin. The weight of the shank bone has in all cases been included both before and after boiling or roasting.

Experiment 19 A leg of small Scotch mutton, weighing 6 lb, afforded 10½ oz. of bone, lost 5½ oz. in the boiling, and the meat weighed 5 lb.: cost 9½*d.* per lb, if butcher's price be 8*d.*

Experiment 20 A leg, weighing 9 lb., afforded 12 oz. of bone, lost in boiling 16 oz.. meat weighed 7 lb. 6 oz. At butcher's price 8*d.*, would cost 10*d.* per lb.

Experiment 21 A large leg of fat excellent mutton, weighing 11 lb. 5 oz., afforded 18 oz. of bone; lost 1 lb 7 oz in boiling. If butcher's price be 8*d.* per lb., the boiled meat will be 10¼*d.* per lb

Experiment 22. A leg of mutton (similar to that in experiment 19) weighing 6 lb. 6 oz, was over-roasted, until the meat became rather tasteless and glutinous. The bone weighed 14½ oz., the loss in roasting was 1 lb. 12½ oz., consisting of 5 oz. of fat and 1 lb. 5 oz. water evaporated· in this case a deep brown rich gravy dropped from the meat, weighing 2½ oz. the meat therefore weighed but 3 lb. 11 oz If the butcher's price be taken at 8*d* per lb., the roasted meat amounted to 1*s*: 2*d.* per lb. Such is the consequence of over-roasting, beside obtaining disagreeable and less nutritious meat, and extruding the juice which otherwise would have remained in it, and contributed to its flavour. The boiled meat in experiment 16, amounted to but 9½*d.* per lb, properly boiled: and in experiments 19 and 20, duly roasted mutton cost but 11¼*d.* per lb

Experiment 23. A leg of mutton, weighing 9¼ lb, was roasted, it gave 16 oz. of bone, the loss during roasting was 1 lb. 14 oz, of which 1 lb. was fat and 14 oz. water evaporated: the meat weighed 6 lb 6 oz. The butcher's price being 8*d.*, the roasted mutton would cost 11¼*d* per lb.

Experiment 24. The fellow leg, weighing 9 lb. 7 oz, was roasted. The bone weighed 16 oz; the loss was 2 lb., of which 1 lb 1 oz. was fat, and 15 oz. evaporated water. the meat weighed 6 lb. 7 oz At 8*d.* per lb, the roasted meat would cost 11¼*d.* per lb.

Experiment 25. A shoulder of mutton, a fat one, weighing 9 lb. 5½ oz., was roasted. The bone weighed 12 oz., the loss was 3 lb. 2 oz., of which 18 oz. were fat, and 2 lb. were water evaporated: the meat weighed 5 lb. 7 oz. If butcher's price be 7*d.*, the roasted meat costs 12*d.* per lb.

Experiment 26. A fine shoulder of mutton, weighing, without the shank bone, 10 lb. 12 oz, was, when properly roasted, found to have lost 2 lb. 11 oz., of which 21 oz were fat and 22 oz. water evaporated. Its bones weighed 13 oz; the roasted meat therefore weighed 7 lb. If the butcher's price was 7*d.*, the roasted meat cost 10¾*d.* per lb.

Experiment 27. Another fine shoulder of mutton, weighing 10¼ lb, when nicely roasted lost 2 lb. 6 oz, of which 11 oz were fat and 1 lb. 11 oz. were water evaporated. The bones weighed 13½ oz; the roasted meat weighed 7 lb. 0¼ oz. Hence, if the butcher's price was 7*d.*, the roasted mutton cost 10¼*d.* per lb.

The following miscellaneous experiments were then made.

Experiment 28. A fore-quarter of lamb, weighing 9 lb, afforded, when roasted, 20 oz of bone, and lost 1¾ lb. in the roasting: the meat weighed 6 lb. If the butcher's price be 8½*d.* per lb., the roasted lamb costs 12¾*d.* per lb.

Experiment 29 Another fore-quarter of lamb, weighing 10 lb, lost 2¼ lb. in the roasting. The bones weighed 22 oz., and the meat weighed 6 lb. 2 oz.: hence the roasted meat cost 12¼*d* per lb

Experiment 30. A ham without its shank, weighing 8 lb, was boiled. The bone weighed 8 oz.; the loss in boiling was 16 oz., and by skinning and browning 8 oz.; the meat was 6 lb. If the first cost of the ham be taken at 10*d.* per lb., the meat duly boiled amounts to 1*s.* 1⅓*d.* per lb.

Experiment 31. A hand of salt pork, weighing 4 lb. 5 oz., lost in boiling 11 oz. The bone weighed 9 oz.:

the meat was 3 lb 1 oz. If the first cost of the pork was 7½d. per lb., the meat when duly boiled cost 10¼d. per lb.

Experiment 32. A leg of pork, weighing 7 lb. 14 oz. without the foot, in salt 7 weeks, lost in boiling 15 oz. The bone weighed 9 oz., the meat 6 lb. 6 oz. If the first cost be 8½d. per lb., the meat duly boiled amounts to 10½d. per lb.

Experiment 33. A square of bacon, best part and very fat, weighing 4 lb., lost 4 oz. in the boiling, the bone weighed 2½ oz.: by browning before the fire it lost 4 oz. more, and the skin removed weighed 4 oz.: then the meat weighed 3 lb. 1 oz. It appears that boiled bacon, by skinning and browning, loses ⅛th of its weight. By browning some of the more oily portions of the fat are removed, and the remainder is thus rendered less luscious. hence this process is not merely calculated to gratify the eye. If the first cost was 8*d.* per lb., the meat duly boiled amounted to 10½*d.*

Experiment 34. A knuckle of veal, weighing 6 lb., when duly boiled lost half a pound. Its bones, perfectly cleared of meat, weighed 2 lb. 6 oz.; the meat weighed 3 lb. 2 oz. Hence, if the butcher's price was 5½*d.*, the boiled meat cost 10½*d.* per lb.

In the following experiments made with poultry no stuffings were used.

Experiment 35. A goose, properly trussed, weighed 4½ lb.: in this state it was roasted, and when sufficiently done was found to have lost 18 oz. The skeleton weighed 12 oz., the meat weighed 3 lb. This goose would cost in London 4*s.* 6*d.* Hence the roasted meat amounted to 1*s.* 8½*d.* per lb.

Experiment 36. Another goose, properly trussed, weighed 4 lb. 5 oz.: it lost in roasting 11 oz. Its skeleton weighed 12 oz.; the meat therefore weighed 2 lb. 14 oz. If the first cost of this goose was 4*s.* 6*d.*, its roasted meat would amount to 1*s.* 6 *d.* per lb.

Experiment 37. A young goose, weighing 3 lb. 11 oz., lost 9½ oz. in roasting. Its skeleton weighed 10 oz., the meat weighed 2 lb. 7½ oz. If its price was 4s., its meat roasted would cost 1s. 7d. per lb.

Experiment 38. A turkey, properly trussed for roasting, weighing 3 lb. 9 oz., its liver and gizzard included, lost 8 oz. in roasting. Its skeleton weighed 7 oz., the meat weighed 2 lb. 10 oz. If the turkey cost 4s., its roasted meat amounted to 1s. 6¼d. per lb.

Experiment 39. A fine turkey, properly trussed, weighed 6 lb. 11 oz., its liver and gizzard included; it lost 20 oz. in roasting. Its skeleton weighed 13¼ oz., the meat weighed 4 lb. 10 oz. If the turkey cost 5s., the roasted meat amounted to 1s. 1d. per lb.

Experiment 40. Another, weighing 5 lb. 7 oz., lost 11 oz. Its bones weighed 12 oz., the meat 4 lb. If the turkey cost 4s. 6d., its roasted meat cost 1s. 1½d. per lb.

Experiment 41. A turkey, with its liver and gizzard, weighing 4 lb. 14 oz., was boiled; it lost 12 oz. The skeleton weighed 13½ oz., the meat 3 lb. 4½ oz. If this turkey cost 3s. 6d., the boiled meat amounted to 1s. 1d. per lb.

Experiment 42. Another, weighing 4½ lb., cost 3s. 6d.; it lost 12 oz. in boiling, and gave 10 oz. of bone and 3 lb. 2 oz. of meat, which was therefore worth 1s. 1d. per lb.

The turkeys exposed for sale in London are occasionally of an enormous size, and sell for a considerable price. A poulterer informs me, that at Christmas-time he has known prize crammed turkeys to reach such a size, that when trussed for roasting each of them averaged 30 lb. weight, although young; and sold for 5*l.* each. If the skeleton weighed 1 lb., and if the loss in roasting were 5 lb., the roasted flesh would amount to 4s. 2d. per lb. The turkey is a delicate bird, and runs great risk of being killed in the attempt to feed it to this size. Stags or old turkeys have sometimes attained the weight of 42 lb., yet sold for 2*l.* 2s.

Experiment 43. A young duck, weighing 20 oz., lost

$5\frac{1}{4}$ oz. in roasting. Its bones weighed $2\frac{1}{16}$ oz.: the meat was $12\frac{1}{4}$ oz. It cost 2*s.* 6*d.*; hence the flesh amounted to 3*s.* $3\frac{1}{2}$*d.* per lb.

Experiment 44. A duck, weighing 1 lb. $10\frac{1}{2}$ oz., lost $6\frac{1}{2}$ oz. in roasting. The skeleton weighed 4 oz.: hence the meat weighed 1 lb. The duck cost 2*s.* 4*d.*; its meat was therefore worth that sum per lb.

Experiment 45. An Aylesbury duck, properly trussed weighed 28 oz. When roasted, it was found to have lost 8 oz.: the bones weighed 3 oz., the flesh 17 oz. As the duck cost 2*s* 6*d.*, this meat cost 2*s* $4\frac{1}{4}$*d.* per lb. The peculiarity of the Aylesbury duck is, that its skeleton weighs less and its flesh more than other breeds of the same size.

Experiment 46. A fowl with its liver and gizzard, weighing $1\frac{1}{2}$ lb., was roasted. It lost 3 oz.: the skeleton weighed $4\frac{1}{2}$ oz., and the flesh $16\frac{1}{2}$ oz. If such a fowl cost 2*s* 6*d.*, its meat when roasted would cost 2*s.* $4\frac{1}{4}$*d.* per lb.

Experiment 47. A chicken, weighing 1lb. $4\frac{1}{2}$ oz., when roasted lost $3\frac{1}{2}$ oz. The bones weighed 3 oz., the flesh $13\frac{1}{2}$ oz. If the chicken cost 2*s.* 4*d.*, the meat roasted was worth 2*s.* 8*d.* per lb.

Experiment 48. A chicken, weighing the same, lost 3 oz. by roasting. The meat roasted therefore cost 2*s.* 8*d.* per lb.

Experiment 49. A chicken, without head or neck, weighing $1\frac{1}{4}$ lb., was boiled: it lost 2 oz. The bones weighed $4\frac{1}{2}$ oz., the flesh $13\frac{1}{2}$ oz. If the chicken cost 2*s.* 4*d.*, the boiled meat cost 2*s.* 9 *d.* per lb.

Experiment 50. A similar one, weighing 1 lb. 6 oz., being boiled, it lost 2 oz. The bones weighed $3\frac{1}{2}$ oz., the flesh $16\frac{1}{2}$ oz. Worth 2*s.* 3*d.* per lb., if the chicken cost 2*s.* 4*d.*

Experiment 51. A similar one, weighing $1\frac{1}{2}$ lb., in boiling lost $3\frac{1}{2}$ oz. The bone weighed 5 oz. the meat $12\frac{1}{2}$ oz. Worth 2*s.* 5*d.* per lb., if the chicken cost 2*s.* 6*d.*

Experiment 52. Another, weighing $17\frac{1}{2}$ oz., when boiled lost 2½ oz. The bones weighed 3 oz.: the flesh 12 oz. Worth 2*s.* 8*d.* per lb., if the chicken cost 2*s.*

Experiment 53. A chicken with its head and neck, weighing 18 oz., when boiled lost 2½ oz. The bones, including those of the head and neck, weighed 4 oz.: the flesh 11½ oz. The boiled meat therefore cost 2*s.* 10*d.* per lb., if the chicken cost 2*s.* 2*d.*

Experiment 54. A very young Surrey chicken, when trussed for boiling, weighed 17 oz., and cost 2*s.* It lost 3½ oz. in boiling, and the bones weighed 3 oz.: the meat weighed 10½ oz. Hence the meat when duly boiled cost 3*s.* per lb.

Experiment 55. A turbot, which when trimmed and ready for dressing weighed 9 lb., was boiled with a simmering heat for half an hour, which was sufficient. It cost 7*s.* The bones, collected with the utmost care, weighed 21 oz.. the loss in boiling was 8 oz. Hence the cost of the eatable parts of the boiled fish ready for table was 11½*d.* per lb.

Experiment 56. A fine mackerel, which when trimmed and ready for boiling weighed 23¼ oz. (including the weight of the roe, 2½ oz.). It cost 10*d.* It lost 1¼ oz. in the boiling. The skeleton, carefully collected, along with the gills, fins, and tail, weighed 4¼ oz. Hence the cost of the eatable parts of the boiled fish was 9¼*d.* per lb.

Experiment 57. A woodcock, weighing 1¼ lb. in roasting, lost 3½ oz.: its skeleton weighed 4¼ oz. In the beginning of the season a woodcock of this weight will sometimes cost 12*s.* If this one had cost so much, its flesh would amount to 16*s.* per lb. At a more advanced period the same article may be procured at one-eighth of the price.

Experiment 58. A piece of Hamburgh hung beef, weighing 3 lb. wanting 1¾ oz., consisting of ribs with their tops cut off, was boiled. It lost 4½ oz., and the bone weighed 9¼ oz. The first cost was 1*s.* per lb.; cost of the boiled meat was 1*s.* 6*d.* per lb.

It will now be necessary to collect the results of all these experiments into a kind of conspectus for the sake of more easy comparison: and it is to be understood, that in the following estimates, when the butcher's price is mentioned it of course comprises meat and bone in the usual manner. *But when the ultimate cost of the* cooked meat is specified, *it refers to the price cost of* the meat only, the bone being considered valueless: and it is supposed that the fatness of the meat was such as good meat is expected to have, without any redundancy being left on it.

From an average of the first five experiments, it appears that, when the butcher's price of ribs of beef is 8½*d.* per lb., the cost of the meat when duly roasted and fit for the table is 11½*d.* per lb., and that the average loss of weight arising from the liquefaction of the fat, and the evaporation of water from the juices is 18 per cent.

From an average of the next six experiments, it appears that, when the butcher's price of sirloins of beef is 8½*d.* per lb., the cost of the meat when duly roasted and fit for the table is 1*s.* 1⅙*d.* per lb., and that the average weight lost during the roasting is 20⅓ per cent.

From an average of experiments 11, 12, and 13. it appears that, when the butcher's price of salted briskets of beef is 6*d.* per lb., the cost of the meat when duly boiled and fit for the table is 8½*d.* per lb., and the loss incurred in boiling, arising from the extraction of fat and juices, is 18 per cent.

From an average of experiments 14 and 15, it appears that, when the butcher's price of salted flanks of beef is 6*d.* per lb., the cost of the meat when duly boiled is 7¼*d.* per lb., and the loss in boiling is 13⅓ per cent.

From experiment 16, it appears that, when the butcher's price of salted tail-ends of beef is 7*d.* per lb., the cost of the meat duly boiled is 8½*d.* per lb., and the loss in boiling is $13\frac{7}{10}$ per cent.

From an average of experiments 17, 18, 19, 20, and 21, it appears that, when the butcher's price of legs of mutton is 8*d.* per lb., *the cost of the meat when duly* boiled and fit for the table is 10*d.* per lb., and that the average weight lost during the boiling is 10 per cent.

From an average of experiments 23 and 24, it appears that, when the butcher's price of legs of mutton is 8*d.* per lb., the cost of the meat when duly roasted is 1*s.* per lb., and the loss incurred by roasting is $21\frac{7}{10}$ per cent No account is here taken of experiment 22, because the meat, being over-roasted, amounted to 1*s.* 2*d.* per lb., and this result would have rendered the average above what it ought to be. The loss incurred by roasting was $27\frac{1}{10}$ per cent.

From an average of experiments 25, 26, and 27, it appears that, when the butcher's price of shoulders of mutton is 7*d.* per lb., the cost of the meat duly roasted is 11*d* per lb, and the loss incurred by roasting is 28 per cent.

From an average of experiments 28 and 29, it appears that, when the butcher's price of the fore-quarter of lamb is 8½*d.* per lb., the cost of the meat duly roasted is 1*s.* 1¼*d.* per lb, and the loss by roasting is 22¼ per cent.

From experiment 30, it appears that, if the first cost of hams be 10*d* per lb, the meat, duly boiled, skinned, and browned, will amount to 1*s.* 1½*d.* per lb., and the loss by boiling is 12½ per cent.

From experiments 31 and 32, it appears that, when the hand and leg of salt pork average 8*d.* per lb., the boiled meat amounts to 10½*d.* per lb., and the loss in boiling is 13½ per cent.

From experiment 33, it appears that, if the first cost of bacon is 8*d.* per lb., the meat when duly boiled, skinned, and browned, amounts to 10½*d.* per lb., the loss in boiling alone being 6¼ per cent.

From experiment 34, it appears that, when the butcher's price of knuckle of veal is 5 *d.* per lb., the meat duly boiled costs 10½*d.* per lb, the loss in boiling being 8⅓ per cent.

From an average of experiments 35, 36, 37, it appears that, at the prices of geese quoted, which average 12½*d.* per lb. for the raw flesh, the cost of the roasted flesh is 1*s.* 7*d.* per lb., and the loss per cent. 19½.

From an average of experiments 38, 39, 40, it appears that, at the prices of turkeys quoted, which average 10*d.* per lb., the cost of the roasted flesh is 1*s.* 2½*d.* per lb., and the loss per cent. is 20½.

From an average of experiments 41, 42, it appears that, when turkeys are sold at the last-mentioned price, the cost of the boiled flesh is 1*s.* 1⅓*d.* per lb., and the loss per cent. is 16.

It appears also that the roasted flesh of turkeys sometimes amounts to 4*s.* 2*d.* per lb.

From experiments 43, 44, 45, it appears that, at the prices of ducks quoted, which average 1*s.* 1¼*d.* per lb. in the raw state, the cost of the roasted flesh is 2*s.* 8*d.* per lb., and the loss per cent. is 27⅙.

From experiments 16, 47, 48, it appears that, at the prices of chickens quoted, which average 1*s.* 6½*d* per lb. in the raw state, the roasted flesh amounts to 2*s.* 7*d.* per lb., and the loss per cent. is 14⅛.

From an average of experiments 49, 50, 51, 52, 53, 54, it appears that, at the prices of chickens last quoted, the average cost of the boiled flesh is 2*s.* 8*d.* per lb., and the average loss is 13½ per cent.

From experiment 55, it appears that, when turbot in the raw state is sold at 9½*d.* per lb., the boiled fish costs 11½*d.* per lb the loss in boiling is 5⅓ per cent.

From experiment 56, it appears that, when mackerel sells in the raw state at 6½*d.* per lb., the boiled fish costs 9⅓*d* per lb., the loss in boiling being 7½ per cent.

From experiment 57, it appears that the roasted flesh of a woodcock sometimes costs 16*s.* per lb., and sometimes 2*s.*

But the flesh of the quail is still more expensive. This bird when fattened is sold at the enormous price of 3*s.*: and when allowance is made for the loss in cooking and the bones, the meat may be estimated at 2 oz., which brings the cost of the cocked flesh to 1*l.* 4*s.*

per lb.' Those to whom such morsels are necessary are not to be envied.

A haunch of venison, weighing 26 lb., will cost 3½ guineas. The meat of this, when roasted and detached from the bone, will amount to about 3*s.* 10*d.* per lb.; and if the animal was more than usually fat, to 4*s.*

The following statement gives the results in a still more abstract form: but the prices apply to London only. The articles are arranged in the order of their costliness in the London market:—

Names of the articles of food estimated	Cost per pound raw	Cost per pound cooked	Loss per cent in cooking
	d.	*d.*	
Salted flank of beef, boiled -	6	7¼	13½
Salted tail-end of beef, boiled -	6	8½	13$\frac{7}{10}$
Salted brisket of beef boiled -	6	8½	18
Mackerel, boiled - - -	6¼	9¼	7½
Legs of mutton, boiled - -	8	10	10
Bacon, best part, boiled -	8	10½	6¼
Hand and leg of salt pork, boiled	8	10⅓	13⅓
Knuckle of veal, boiled - -	5½	10½	8⅓
Shoulders of mutton, roasted -	7	11	28
Ribs of beef, roasted - -	8½	11½	18
Turbot, boiled - - -	9¼	11½	5¼
Legs of mutton, roasted - -	8	12	21$\frac{7}{10}$
Turkeys, boiled - - -	10	13⅓	16
Sirloin of Beef, roasted - -	8½	13⅙	20¼
Fore-quarter of lamb, roasted -	8½	13½	22¼
Hams, boiled - -	10½	13⅓	12½
Legs of mutton, over-roasted -	8	14	27$\frac{1}{10}$
Turkeys, roasted - - -	10	14⅓	20½
Hamburgh hung-beef, ribs -	12	18	9½
Geese, roasted - - -	12½	19	19½
Woodcocks, roasted, cheap season		24	
Chickens, roasted - - -	18½	31	14¾
Chickens, boiled - -	18½	32	13½
Ducks, roasted - - -	13¼	32	27⅙
Haunch of venison, roasted -	—	46	
Turkeys, large, crammed - -	—	50	
Woodcocks, scarce season - -	—	192	
Quails, fattened - - -	—	288	

It appears from the experiments, that

The loss per cent. on roasting beef, viz. sirloins and ribs together, is - - - - -	19⅙
The loss per cent. on roasting mutton, viz. legs and shoulders together, is - - -	24⅙
The loss per cent. on roasting lamb, viz. the fore-quarter, is - - - - - -	22⅓
The loss per cent. on roasting geese is - -	19½
The loss per cent. on roasting turkeys is - -	20⅓
The loss per cent. on roasting ducks is - -	27⅙
The loss per cent. on roasting chickens is - -	14⅔

Thus the loss on roasting varies from 14⅔ to nearly double that rate. The average loss on roasting butchers' meat is 22 per cent., and on roasting domestic poultry is 20½.

The loss per cent. on boiling mutton, viz. legs, is	10
The loss per cent. on boiling hams is - -	12½
The loss per cent. on boiling salt beef is - -	15
The loss per cent. on boiling salt pork is - -	13⅓
The loss per cent. on boiling bacon is - -	6¼
The loss per cent. on boiling knuckles of veal is	8⅓
The loss per cent. on boiling turkeys is - -	16
The loss per cent. on boiling chickens is - -	13½

Thus the loss on boiling varies from 6¼ to 16. The average loss on boiling butchers' meat, pork, hams, and bacon is 12, and on boiling domestic poultry is 14¾.

These estimates of butchers' meat do not agree with those of Professor Wallace. I shall select for contrast all those cases that can be compared.

	Wallace	My trial
100 pounds of beef lost in boiling .	26⅓	15
100 pounds of beef lost in roasting .	32	19⅙
100 pounds of legs of mutton lost in boiling - - - -	21⅓	10
100 pounds of shoulders of mutton lost in roasting - - -	31⅓	28

The average loss in boiling and roasting together is, according to Professor Wallace, 28 per cent; according to my trials it is but 18. I know not how to reconcile these results otherwise than by supposing a difference in the meat, or its fatness, or in the duration of the heat. I used meat of sufficient, but not unprofitable fatness, such as is preferred in families; the meat was in all cases a little rare at its centre; and the results were determined with the utmost care.

In great public institutions, where economy is studied and every thing is regulated by weight and measure, tables of this kind do not afford a guide that is to be implicitly relied on. It is obvious that another element must be taken into the calculation to ensure true results, —the ratio in which each article of food satisfies the appetite, which varies with almost every individual.

CHAP. VI.

ON THE USE AND ABUSE OF ANIMAL FOOD: AND ON THE QUALITIES OF DIFFERENT SPECIES.

It is a question which has often been agitated, whether animal food is the natural sustenance of man, or whether the desire and apparent necessity for it are the results of habit. Gassendus conceived that it was not originally natural for man to feed on flesh, although by long usage, at least ever since the flood, we have been accustomed to its use. This opinion he founded on the structure of the teeth, and some other considerations. The human teeth are chiefly incisor or cutting teeth, and molar or grinding teeth; and of such as in carnivorous animals are calculated to tear flesh there are but four, called canine teeth: from this Gassendus was disposed to conclude that nature had constructed our teeth for cutting herbs and roots, or for grinding grain, nuts, and hard fruits, but not for tearing flesh. When we do feed on flesh, it must undergo a previous process of cookery, and even in this state we refuse it to those labouring under various diseases. Children, before their palates are vitiated by custom, are fonder of fruits than of flesh-meat; and their breeding worms has been usually attributed to the too early use of animal food Gassendus remarked, that custom may make that seem natural to us which nature never intended: and instances a lamb reared on ship-board, which afterwards refused the green pasture of the fields for the diet it was formerly used to.

The opinion of many divines has been, that before the flood men did not feed on flesh; and this was founded on God's own declaration to Noah after the flood, Gen. ix. 3.. "Every moving thing that liveth shall be meat for you, even as the green herb have I given you all things." And in Gen. i. 29. God says to Adam, "I have given you every herb bearing seed which is upon the face of all the earth, and every tree in the which is the fruit of a tree yielding seed; to you it shall be for meat." but no permission is here given to feed on the flesh of animals. Yet Abel was a keeper of sheep, and Cain a tiller of the ground; both employments seeming equally to tend to the production of animal food. To the force of this argument it may be replied, that these animals were slain for sacrifice, and the sheep only fed for that purpose. But even sacrifices, observes Dr. Wallis, seem to have been offered only as a portion or first fruits of things appointed for food: and as Cain was not to sacrifice the whole fruit of his tillage, so neither was Abel the whole product of his sheep, but only the best, that is, the firstlings of his flock, and the fat thereof, reserving the best for his own use. And it does not seem likely that God would give Noah after the flood a greater dominion over other animals than had been given to Adam in Paradise before the fall. Dr. Wallis considers this permission to Noah not as contradistinct from that to Adam, but rather as introductory of the prohibition which presently follows; viz., that though he might eat flesh, even as the green herb, so far as it might be wholesome food, yet "not with the blood thereof;" that is, he might not eat raw flesh. The same rule is given to other animals, Gen. .. 30., as is to man at v. 29., "I have given them every green herb for meat:" yet there are many carnivorous animals, although they have not any further permission that we know of.

In support of the opinion, that man was intended by nature to feed on flesh, Dr. Wallis adduced the construction of the alimentary canal. He observed, that in general animals which feed on plants have a long colon in order to render the passage of the food through it of greater duration, while in carnivorous animals such a colon does not exist; but in place of it a short and slender intestine is present, through which the passage of the food is much more rapid. In man the colon is very remarkable. But Dr. Tyson remarked, that this structure no more affords a rule to judge of the proper food of animals than would the existence of four stomachs in many of those that live on herbs: for some that are graminivorous have but one stomach. He concluded, that as man has teeth fitted for both animal and vegetable food, the intention of nature was plainly that he should subsist on both. And the same reason may in fact be assigned for his having an intestinal canal resembling that of animals which subsist upon vegetables: being long enough for the digestion of vegetable food, it is *a fortiori* so for animals.

Of this subject Majendie gives the following summary:—"There always exists an evident affinity between the kind of aliment which an animal feeds on, and the disposition of the digestive apparatus. If these aliments are widely distant in their nature from the component elements of the animal; if, for example, the latter be herbivorous, the apparatus will possess very considerable dimensions, and also be more complicated. If, on the contrary, the animal lives on flesh, the digestive organs will not only be less numerous, but much more simple, as may be seen in the carnivorous species. Man being ordained to make use equally of animal and vegetable substances, steers between the two with regard to the disposition and complication of his digestive apparatus, i. e. between the herbivorous and carnivorous, without, nevertheless, subjecting himself to the appellation of omnivorous. Is it not known that a great many of the substances with which animals nourish themselves are of no use to man?"

In short nothing seems more clear than, that man is constituted in such a manner as fits him to subsist on both animal and vegetable food: and being so, it seems a reasonable inference that he should conform to his construction and make use of this mixed kind of aliment, when it is in his power to do so, under the very necessary restriction of duly regulating the proportion of each.

Unfortunately there are circumstances under which the observance of this rule is impracticable. Some through disease or a peculiarity of constitution are unable to use a mixed diet. some through poverty are compelled to dispense with animal food, and to live exclusively on vegetables. The poorer orders of the peasantry in Ireland are almost strangers to animal food: they live chiefly on potatoes; and consider themselves well off when along with them they can substitute buttermilk for salt. Yet the athletic frame, ruddy countenance, longevity and intelligence of the Irish peasantry evince that the privation of animal food, however severe a trial to the natural likings of man, does not disqualify him from discharging all the functions of a human being in an eminent degree. The inhabitants of Caffraria, although they possess abundance of flocks, prefer their milk, but scarcely use their flesh. they live upon a vegetable diet, yet they are long-lived, and little subject to diseases.

The facts however prove, that the construction of man has qualified him to subsist on animals, or vegetables, or on both,—a splendid instance of the wide range of circumstances under which he is calculated to support existence; and the difficulties with which he is competent to contend. This being the case, it becomes a question for those whom Providence has blessed with the means of selecting food according to their choice;

do they apportion the ratio of animal and vegetable aliments in the way that is most agreeable to health and conducive to long life? Can we draw any inference on this subject from the unwieldy body, bloated countenance gouty limbs, decayed strength, and inaptitude for corporeal occupation so common amongst those who have always had it in their power to gratify their likings; and so rare amongst those whose diet has been modified and restricted by poverty?

With regard to the relative quantities of animal and vegetable matter that should constitute food of the most wholesome quality, little argument need be adduced Most persons admit that the latter should be at least equal to the former, although they do not always act upon that opinion.

Dr. Cheyne however would not allow even an equal quantity of animal and vegetable food, but directed 8 oz. of the former to 12 oz of the latter. It is true, he made no reference to the *real* quantity of vegetable matter in vegetables, neither is it to be supposed that he founded his opinion upon actual weighing, but rather on a ratio determined by his opinions of what would constitute in the stomach a mass from which nutriment of proper quality and quantity could be produced, and dispersed throughout the various parts of the body. Some vain speculators have concluded, that because in the human mouth there are twenty molar teeth fit for grinding grain, nuts, &c., and twelve others called incisors and canine, calculated for tearing flesh, the ratio of food pointed out by nature is twenty of vegetable to twelve of animal. —Can any thing be more absurd? Others are of opinion, that the vegetable food ought to exceed the animal. Dr. Cullen, no mean authority, says, that the sparing use of meat is the surest means of preserving health, and obtaining long life.

Persons who have the best intentions towards health, in proportioning their quantum of animal to vegetable food, are sometimes much deceived on that point, not being aware of the small quantity of solid matter which exists in a large bulk of a given esculent vegetable. The potato, the chief vegetable of the dinner-table, varies in its composition according to the kind. Mr. Skrimshire has shown, that in the potatoes called rough reds, moulton whites, Yorkshire kidneys, and ox nobles, rather more than three quarters of their whole weight are water; and that the quantity of nutritious matter in 1 lb. averages but 3½ oz. In the white kidney and purple red the ratio is still less, 1 lb. containing but 2½ oz. Vauquelin estimates the nutritious portion of potatoes at 4 oz. in the pound, or 25 per cent. The analysis of Dr. Pearson may be reduced to nearly the same ratio. That of Einhoff, of foreign potatoes, affords a result nearly similar. We may therefore safely assume that one quarter only of the weight of potatoes is solid vegetable nutriment. According to Vauquelin and Percy, 1 lb. of good bread is equal in nutritive power to 2½ lb. of potatoes: and 75 lbs. of bread and 30 of meat, are equal to 300 lb. of potatoes.

Cabbage has been examined by Schrader, and found to contain, in every hundred parts by weight, but $6\frac{7}{10}$ of solid matter: that is, 1 lb. contains less than 1 oz. of matter that can contribute nourishment. This agrees pretty nearly with the estimate of Sir H. Davy.

Greens, according to Vauquelin, contain 8 per cent. of solid matter capable of nourishing, or 1¼ oz. in the pound.

Turnips, according to Sir H. Davy, contain but 4½ per cent. of solid nutritive matter; that is, 1 lb. contains less than three-quarters of an ounce. Vauquelin, however, represents the quantity at 8 per cent.: and he found that 3 lb. of turnips and 4 lb. of cabbage are equal in nutritive effect only to 1 lb. of potato.

Carrots, according to Sir H. Davy, contain 9½ per cent. of solid matter capable of nourishing; but Vauquelin's estimate is 14. Adopting a mean therefore, we find that 1 lb. of carrots supply nearly 2 oz. of solid nutriment.

Green pease may be inferred, from the analysis of

Einhoff, to contain about 70 per cent. of solid matter, but how much of this is nutritive it is hard to determine: Vauquelin's says, they contain 93 per cent. Sir H. Davy estimates the solid matter of dried pease at but 57 per cent; and if this be correct, it is not possible that green pease can contain any thing like the quantity stated by Vauquelin, or even Einhoff. It is evident, however, that pease are rich in nutriment, and possess this peculiar quality, that about one-fifth of the solid matter estimated in the analysis of Einhoff, partakes somewhat of the nature of animal matter.

Beans also contain this partly animal, partly vegetable substance. The solid nutritious matter contained in beans, according to Davy, is 57 per cent: the same as in pease. The beans examined by Einhoff, contained about 75 per cent. of matter which might be supposed capable of nourishing. According to Vauquelin, French beans contain 92 per cent. of nutriment. and, modifying Einhoff's analysis of kidney beans, it would appear that they contain much about the same proportion.

The other vegetables used at table have not been examined by chemists as to the quantity of solid matter in them; but the examples adduced, which of course can only be admitted as approximations to an estimate of nutritive power, prove that the vegetable esculents most commonly made use of contain but a small ratio of real vegetable matter; and even the whole of that may not possess the power of nourishing. This is a most important consideration to be taken into account.

Butchers' meat, taking one kind with another, averages 35 per cent. of real nutritive matter. at least such was the estimate presented by MM. Vauquelin and Percy to the French minister of the Interior. Adopting this determination, we are prepared to appreciate the quantity of real nutritive matter received into the stomach when a meal of plain meat and vegetables has been eaten: it is not practicable to come to any conclusion when made dishes are used. It is a subject of interest, and particularly so to the inhabitants of the British isles, who are said by foreigners to make use of more animal food than is necessary or wholesome. In order to set the inquiry in an intelligible point of view some homely subjects must be brought before the reader, and some calculations on matters that are not generally made questions of arithmetic: the results will perhaps be such as he had not anticipated, and will probably repay him for the scrutiny that is made into the secrets of his dinner-table. In the following estimates it is supposed that the animal food made use of is mutton, and that no other is ever resorted to; a supposition adopted to avoid confusion, and easily modified into the assumption of any other meat by reference to the preceding chapter. Some persons may smile at the apparently whimsical turn which a subject of this kind must assume, but should they chance to recollect amidst their pleasantry that perhaps curtailment of life is concerned, they may find something in these speculations of a graver character. One example of this mode of viewing the subject will suffice: —

Let 10 oz. of boiled mutton from the leg, without bone or any other part to be rejected, 8 oz of potato, and the same of turnip, be assumed as an ordinary dinner for a healthy male adult, who has not any considerable corporeal labour to undergo. To produce 10 oz. of solid boiled meat, about 11 oz in the raw state will be necessary, which, according to Vauquelin, contains $3\frac{8}{10}$ oz of solid nutriment, the rest being water: the 8 oz. of turnip contain about one-third of an ounce of solid nutriment: and 8 oz. of potato, 2 oz. Thus of solid vegetable nutriment there are $2\frac{1}{3}$ ozs., derived from the turnip and potato together: but of solid animal nutriment there are $3\frac{8}{10}$ oz. In order to render the animal and vegetable nutriment equal; it would be necessary, that with the quantity of vegetables already mentioned the portion of boiled meat should be about $6\frac{1}{4}$ oz. The actual weight of the gross quantity received into the stomach would then be about 23 oz; but the weight of real nutrition would be 4 $\frac{7}{10}$ oz. Should this be deemed an insufficient meal, both animal and vegetable food ought to be increased in the same ratio as above.

In order then to equalise the animal and vegetable matter, and to increase the total quantity, the ratio should be 8 $\frac{1}{2}$ oz. of boiled mutton, 10 oz. of potato, and the same of turnip: the total amount of food swallowed will be 28 $\frac{1}{2}$ oz.; but the quantity of real nutriment will be but 6 oz., half being animal and half vegetable matter. This is certainly a sufficient meal for most persons who have but little laborious occupation: for if a pint of liquid be drank at the same time, the load on the stomach will weigh 3 lb.: and this will be increased to 4$\frac{1}{4}$ lb. if a pint of wine be swallowed. Now, the difference between 8 $\frac{1}{2}$ oz. of boiled meat and 10 oz appears very trivial; but, if the greater of the two quantities be persevered in regularly every day for the term of a man's adult life of half a century, it may excite a little surprise in the person who practises it to learn that he will have consumed a flock of sheep, consisting of about fifty-three head, in excess above what he ought to have made use of. In a life of sixty-five years, allowing 8 $\frac{1}{2}$ oz. per day for fifty years, two-thirds of that quantity for ten years, and 3 oz. a day for three years of childhood, the total animal food amounts to 350 sheep. If to this be added the excess above mentioned, the number of sheep the cooked meat of which is devoured by one man during a life of sixty-five years is about 400; along with five tons of potatoes, about the same of turnips or other vegetable, nine tons weight of common drink, and six tons weight of wine, at one pint per day for thirty years only: thus for dinner alone above thirty tons weight of solids and liquids must have passed through the stomach. Inordinate work will wear out any machinery before its time, especially if the work performed be of a peculiarly wearing character. Whether it is advisable to add the fifty-three unnecessary sheep to one's dinner, is a question which every reader will answer to himself as he thinks proper. The food of old Parr, who died at 153 years of age, consisted of cheese, coarse bread, milk, and small beer. Would it have made no difference in the duration of his life if he had swallowed 1050 sheep for about this number would have been his share at the usual rate, along with his twenty tons of wine? It may assist in drawing a conclusion, to recollect that when he was brought to London and lived in splendour, "fed high, and drank plentifully of the best wines," he soon died: and his death was generally attributed to that cause, for he had vigour of body "to have lived a good while longer," as the reporter says.

With regard to apportioning the quantity and quality of food under various circumstances of age, constitution, occupation, and climate, Dr. Paris, in his "Treatise on Diet," has laid down some precepts which seem to comprise all the information that need be known or practised on this subject. He says, "As every description of food, whether derived from the animal or vegetable kingdom, is converted into blood, it may be inferred that the ultimate effect of all aliments must be virtually the same, and that the several species can only differ from each other in the quantity of nutriment they afford, in the comparative degree of stimulus they impart to the organs through which they pass, and in the proportion of vital energy they require for their assimilation. Were the degree of excitement which attends the digestion of a meal commensurate with the labour imposed upon the organs which perform it, less irritation and heat would attend the digestion of animal than of vegetable food; for in the one case the aliment already possesses a composition analogous to that of the structure which it is designed to supply, and requires little more than division and depuration; whereas in the other a complicated series of decompositions and recompositions must be effected before the matter can be animalised or assimilated to the body. But the *digestive fever*, if we may be allowed the use of that expression, and the complexity of the alimentary changes would appear in every case to bear an inverse relation to each other. This must depend upon the fact of animal food affording a more highly animalised chyle, or a greater proportion of that principle which is essentially nutritive, as well as upon the immediate stimulus which the alimentary nerves receive from its contact. In hot countries therefore, or during the heats of summer, we are instinctively led to prefer vegetable food; and we accordingly find that the inhabitants of tropical climates select a diet of this description: the Bramins in India, and the people of the Canary Islands, Brazils, &c., live almost entirely on herbage, grains, and roots, while those of the north use little besides animal food On account of the superior nutritive power of animal matter, it is equally evident that the degree of bodily exertion or exercise sustained by an individual should not be overlooked in an attempt to adjust the proportion in which animal and vegetable food should be mixed. Persons of sedentary habits are oppressed, and ultimately become diseased, from the excess of nutriment which a full diet of animal food will occasion; such a condition, by some process not understood, is best corrected by acescent vegetables. It is well known that artisans and labourers, in the confined manufactories of large towns, suffer prodigiously in their health whenever a failure occurs in the crops of common fruits; this fact was remarkably striking in the years 1804 and 1805. Young children* and growing youths generally thrive upon a generous diet of animal food; the excess of nutritive matter is consumed in the development of the body, and, if properly digested, imparts strength without repletion. Adults and old persons comparatively require but a small proportion of aliment, unless the nutritive movement be accelerated by violent exercise and hard labour.

Those who advocate the exclusive value of animal food, and deny the utility of its admixture with vegetable matter, adduce in proof of their system the rude health and Herculean strength of our hardy ancestors. The British aborigines, when first visited by the Romans, certainly do not appear to have been conversant with the cultivation of the ground, and, according to the early writers, Cæsar, Strabo, Diodorus Siculus, and others, their principal subsistence was on flesh and milk; but before any valid conclusion can be deduced from this circumstance, the habits of the people must be compared with those of their descendants. The history of later times will furnish us with a satisfactory answer to those who deny the necessity of vegetable aliment. We learn from the London bills, that scurvy raged to such an excess in the seventeenth century as to have occasioned a very great mortality. at this period the art of gardening had not long been introduced. It appears that the most common article of the kitchen garden, such as cabbages, were not cultivated in England until the reign of Catharine of Arragon; indeed, we are told that this queen could not procure a salad until a gardener was sent for from the Netherlands to raise it. Since the change thus happily introduced into our diet, the ravages of the scurvy have been less severely experienced.

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* The aliment of almost every animal, in its first stage of life, is composed of animal matter, even graminivorous birds are nourished by the yolk for several days after being hatched

It follows, then, that in our climate a diet of animal food cannot, with safety, be exclusively employed. It is too highly stimulant; the springs of life are urged on too fast, and disease necessarily follows There may nevertheless exist certain states of the system which require such a preternatural stimulus; and the physician may therefore confine his patient to an animal regimen with as much propriety as he would prescribe opium, or any other remedy. By a parity of reasoning, the exclusive use of vegetable food may be shown to be inconsistent with the acknowledged principles of dietetics, and to be incapable of conveying a nourishment sufficiently stimulating for the active exertions which belong to our present civilised condition. At the same time it must be allowed, that an adherence to vegetable diet is usually productive of far less evil than that which follows the use of an exclusively animal regimen."

Notwithstanding the vegetable origin of bread, it can scarcely be considered as mere vegetable matter. Wheat contains pure vegetable matter along with a substance, amounting to one-fourth of its weight, called gluten, which very much approximates to the character of animal matter. During the fermentation which dough undergoes, a change in both these ingredients takes place. Indeed, without any reference to chemical constitution, the taste, consistence, texture, and appearance of bread seem to detach it in some degree from the class of vegetable food The subject ought certainly to be kept in view by those who make a dinner of animal food and bread only, they supposing that they have made use of a proper mixture for a wholesome meal. Celsus considered bread as equal to flesh in its capability of nourishing: and if there is any truth in this opinion, the mistake of those is very great who use it at dinner without any other vegetable matter to dilute the stimulus of the animal food.

Some very absurd notions have prevailed amongst those who accustom themselves to a full diet of animal food concerning its beneficial influence on the moral and physical development of man, and positions of the same kind have even been laid down by writers, which seem equally at variance with reason and experience. "Some have asserted (says Baron Cuvier) that man, without the use of flesh diet could neither exist nor propagate his kind: that he requires the solid nourishment of animal food to stimulate him to activity, to give vivacity to his senses, perfect strength and vigour to his frame, courage and energy to his mind. The inhabitants of the northern extremities of Europe and Asia, the Esquimaux, and the people of Terra del Fuego live entirely on flesh — and that often raw; and yet in strength, size, and courage, are far inferior to the rest of mankind. This proves that animal diet does not necessarily confer moral and physical energy. Again, vegetable diet is not connected with weakness and cowardice. The Greeks and Romans subsisted chiefly on vegetable preparations, at a period when their valour and energy rendered them the terror and admiration of surrounding nations. The Irish and Scotch, who are not weaker than ourselves, live chiefly on vegetable aliment. The Swedes, under Gustavus and Charles, were herbivorous and invincible. The negroes, distinguished for all kinds of physical energy, live chiefly in the same way, and so do the South-sea islanders, whose agility and strength were found infinitely to surpass those of our stoutest sailors. On the other hand, the debilitating effects of animal food are altogether without foundation: there is not a vestige of evidence that any period ever existed when the whole human race abstained from flesh, and lived in a state of perfect innocence and profound peace. This golden age of immaculate virtue is but the creation of poetical fancy, or the offspring of the heated brains of some visionary enthusiasts. That the use of animal food is consistent with the utmost energy both of body and mind, is amply proved by the experience of every individual. But all history testifies on this subject, with a voice from which there is no appeal. The myriads of Hindoos who subsist on vegetable diet are held in subjection by a few hundreds of Europeans. When the ancient Romans abandoned this vegetable diet they did not decline in moral and physical energy, or in political power. Look at the diet of that nation which has produced some of the most illustrious names in the records of the human race, whether in literature, science, political, civil, or military eminence; the country of Shakspeare, Newton, Locke, and Milton. With such examples before us it is monstrously absurd to assert, that animal food is productive of any detrimental effect on the development and powers of the human mind and body."*

Many are the rules laid down by physicians to guide mankind in the management of dietetics; and medical criticisms on the perfections and defects of various aliments, and the propriety or impropriety of their use in peculiar constitutions have been offered to the world. Some are indigestible, some heating, some acescent, others flatulent, and to each has been attributed a character peculiar to itself. I omit these rules and characters, believing that the whole of what can truly be said on the subject amounts to the simple aphorism, easily understood and applied, that whatever agrees with any individual is fit food: that every man's experience of his own stomach is the best test of what is wholesome *for him*; and that his experience of the decisions of this judge is the best guide for determining what should be used and what rejected. The character seems not to belong to the food but to the stomach which receives it: that which is stigmatised in books as indigestible, acescent, or flatulent, may indeed prove so to a few persons, —perhaps to the writer of the book in which the statement is made; but to one hundred others, its assimilation may turn out to be a very easy process. An article of food which is safe and nutritious in one country, may be even poisonous in another—for there are national, as well as individual idiosyncrasies or the nature of such an article of food may vary with the climate, and of this instances are common. To live according to the dogmas of dietetic writers is not a little troublesome; and, in the course of some medical experience and intercourse with valetudinarians, I have witnessed very bad effects from the study of books, filled with fastidious criticisms on food and fanciful distinctions of qualities, which, in truth, apply but to a small portion of mankind, yet are calculated to excite doubts and apprehensions amongst the weak-minded and hypochondriacal to an injurious extent.

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* Cuvier, by Griffith, 145

Indeed it seems a question, which would admit of controversy, whether too little or too much care in diet is more injurious. After all, perhaps Pliny was the best adviser when he said, that in the selection of particular kinds of food we should not be too precise; that we should accustom ourselves indifferently to all kinds of diet, and nourish the body from a variety of sources. An illustration of Pliny's opinion is, that those accustomed for a long time to vegetable food only can with difficulty digest animal food, and persons who rarely use fish are sure to be disagreeably affected by it when they do. I have known venison to sicken a whole family, and to produce fainting in one who used it for the first time at a late period of life. The same disagreement has happened to persons who ate a meal of sturgeon for the first time: that animal it is to be remembered is, in a culinary point of view, neither fish nor flesh: and turtle, a rare diet to most persons in this country, is very apt to disagree; although in parts of the world where turtles abound, nothing can sit more lightly on the stomach.

In searching for a code of diet, some persons have referred all controverted questions to the practice of those who undertake the training of pugilists, and others who make the exercise of personal strength their profession. The reason assigned for such a proceeding is, that it is an appeal to experience and to practice much scrutinised; and universally sanctioned in cases where failure of the desired results produces some considerable consequences, becomes matter of immediate notoriety, and involves loss of fame to some and of vast sums of money to others. If, however, we look to the persons who practise this empyrical art, consider their total want of education generally of any kind, but particularly of medical education, so necessary a protection against whimsical and ignorant prejudices, if we look to their opinions, and find that instead of being founded on observation they are mere baseless fancies, vulgar errors, or mistaken analogies, a reference to the practices and opinions of such persons must fail to convince or even to influence our conclusions.

Notwithstanding the conviction just now expressed, that the diffuse rules laid down in books for directing the choice of diet are of little use, on account of the vast diversity observable in the human constitution, and the inapplicability of any rule to circumstances so variable, yet every one must admit that there are a few general principles which apply to a great number of persons, because they are founded on the obvious constitution and characteristics of aliments. A knowledge of these characteristics spontaneously supplies these general principles, and hence the latter may be of some use. The statements which follow are chiefly taken from Dr. Cullen, whose opinions on these subjects seem to be for the most part mere expressions of facts, and less encumbered with hypothetical notions than those of most other writers. The opinions of Cullen, it may also be observed, are the originals from which many subsequent authors have mainly drawn their supplies of information.

In the same species of animal the density is different according to the sex, the substance of the male being always more dense than that of the female. In the male sex, however, emasculation at an early period of life makes a considerable change, as it prevents the animal from acquiring the same density of substance which it would have otherwise acquired. This operation has also the effect of disposing the animal to grow fat, and by so doing to render the meat more soluble.

In the same species, the density of its substance is different according to the age of the animal; and as the density is always increasing as the animal advances in life, so young meat is universally more soluble than old: and so much is this the case, that in many species we employ only the young as diet A difficulty however occurs here; although, from their texture, young animals are more soluble than old, and appear to be so in decoctions with water, yet in some stomachs the young meats are more slowly digested than the old *; and thus with such persons veal is more slowly digested than beef, and lamb than mutton. Another cause for the difference of digestion mentioned may, in some cases, be the more gelatinous nature of young meats than old; and this seems to have a share, for the jellies of all animal substances, though extracted from old animals, putrify more slowly, and with more previous acescency, than the recent juices. And it may not be improper to observe here, that in acescent stomachs, liquid aliments, though extracted from animal substances, are more difficultly digested than solid meats. Does not this happen because liquidity favours acescency?

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* Mr Abernethy, instead of making this position an exception, affirms it to be a general one He says, " that young and white animal food is in general more difficultly digestible than that which is brown and of middle age " Dr Paris is also of this opinion, although it is at variance with popular convictions.

In animals of the same species, sex, and age, the flesh of individuals is of greater or less density as they are fatter or leaner. In lean animals, the fibres of which their flesh is composed are more closely compacted together, while in those that are fatter the fibres are more separated by a cellular texture, filled with oil, the flesh of the latter, therefore, is not only rendered more soluble by the laxity of its texture, but also by the quantity of oil which enters into the substance of the fibres.*

In the same animal, the solubility is different in different parts of it. Of the fleshy parts, connected by a loose cellular texture, the solution readily takes place; whereas the membranous parts in the tendons and ligaments, where the texture is more closely compacted, dissolve with more difficulty

Meats, in other respects of the same qualities, are more soluble according as they are further advanced towards putrefaction. Putrefaction, to a certain degree, destroys the cohesion of all animal substances, and the tendency to this, if it be not prevented by the want of air, by cold, or by antiseptics, begins as soon as the animal dies. It is for this reason that meats recently killed are not so soluble as those that have been kept for some time. There is, however, a period in the progress of putrefaction at which animal food becomes unfit for the human economy; but it is difficult to determine the limits, for there are some stomachs to which meats are highly offensive when any approach to putrefaction is discoverable in them, either by their taste or smell: while there are others in which those highly tainted are readily digested, and perhaps more readily than if they were less so.

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* This opinion of Cullen is to be understood as applicable to meat in which the lean is interspersed with streaks of fat, — a condition commonly expressed by the word *marbled* Such meat is universally admitted to be the best Mr Abernethy observes that very fat meat should be eaten sparingly But this can only be applied to the guidance of weak stomachs. every one's experience has acquainted him with the fact, that the robust peasantry of England thrive well upon bacon, in which the fat is to the lean as ten or twenty to one

Mr Abernethy objects to meat that is very fat, or much salted, or fried, and conceives that it is difficult of digestion Fried slices of bacon possess just these three qualities, yet practitioners are much in the habit of recommending such food, at breakfast, to persons of delicate appetite and weakened power of stomach, which seems to show that they do not find any bad consequences to arise from the practice "

Not only are animal substances more soluble as they are more advanced towards putrefaction, but they seem also to be so according as they are more disposed to suffer that change. Aliments will be more or less quickly dissolved by the gastric juice according to the degrees of solubility of each, as determined by the circumstances above mentioned. The quantity of nourishment in any meat which the gastric juice entirely dissolves is in proportion to the quantity of animal matter which it contains. Upon this ground it may be concluded, that in equal weights of beef and veal there is more nourishment in the former than in the latter.

To terminate the consideration of aliments taken from quadrupeds, some remarks must be made on their effects in general on the human constitution. The first is, their affording, when taken in equal quantities, more nourishment than any vegetable aliments do: the latter can afford the elements necessary for nutrition, but certainly in small ratio compared with their bulk or weight; whilst animal substances that can be entirely dissolved in the gastric juice seem, in proportion to that quantity, to be almost entirely convertible into juice and blood: they must therefore greatly increase the plethoric state of the blood-vessels. Animal food is always ready to induce this state; and therefore it will always favour, and probably hasten, the growth of young persons; and, although in adults exercise and other mean may prevent its having this effect, it will always have a tendency to produce plethora and obesity; which, when considerable, must straiten the sanguiferous system.

Animal food having thus a tendency to fill the blood-vessels, it must give a greater degree of strength to the whole body; and it will readily appear that it is likely to increase the irritability of the system.

As the balance between the several parts of the system may not always be exact, so the plethoric state may be greater in one part than in another; and thus dispose to diseases according to the part affected.

Every kind of food taken into the stomach increases the action of the heart, and occasions frequency of pulse; and as the energy of the brain is thus directed to the heart and stomach, a torpor in the animal functions, both of sense and motion, is induced; and these effects are more considerable from animal than from vegetable food: accordingly, after a full meal, there is in man, as well as in brutes, a propensity to sleep. On the question, whether this propensity should be gratified or resisted, Dr. Cullen says, I am persuaded that in elderly persons, after a mid-day meal, it may in some degree be indulged: but I am equally persuaded, from my observation and experience, that a full supper immediately before going to bed is generally hurtful.

Although animal food may be admissible,—and in certain circumstances necessary, and therefore in many cases consistent with health,—for the most part a small portion only of it is required. The very temperate and sparing use of it is the surest means of preserving health and obtaining long life; while the free use of it tends to the production of diseases, and to the aggravation of those that from other causes may incidentally come on.

ALIMENTS FROM MAMMALIA.

The *Bos*, or ox kind. The flesh of the ox is the most dense of any derived from quadrupeds: and how far that density goes in preventing solubility we have an instance in the bull, whose flesh is seldom chosen as a part of our diet. The flesh of the female is of a much more soluble nature, and sufficiently fit for nourishment; but we commonly prefer the emasculated ox, in which the fat is better mixed, the flesh more sapid, and, unless from a very old animal, is generally to be preferred.

Veal, as less dense, appears in our decoctions to be more soluble, and in consequence gives a more gelatinous extract than the flesh of the adult, but it is not therefore more nutritious, as the gastric juice dissolves more than the water in our decoctions.

In young animals, the softer texture depends on there being little difference between the muscular fibres and the cellular texture interposed between them. But this state is limited to a certain period of their growth In veal, it is when the calf is under two months old; for after that, and sometimes before it, the muscular fibre becomes more distinguishable, and the whole substance less tender.

Ovis, or the sheep kind. These afford a dense substance, but less so than that of the ox kind. The difference of sex has the same effects in this as in the ox kind; and the flesh of the emasculated animal is universally preferred. In this species, more than any other, the meat becomes more sapid, and seemingly more easily digested at a certain advanced period of its life than when it is younger. Mutton, under two years old, is less sapid and more difficultly digested than when it is several years older; and it seems to be in its greatest perfection at the age of five: this we ascribe, in part, to the proportion which the cellular texture filled with oil bears to the solid fibres between which it is interposed. But as the density of the solid increases as life advances, this circumstance may, at a certain period, very much diminish its solubility. The same difference obtains between the full-grown sheep and *lamb*, as between beef and veal. If the lamb is allowed to be suckled by its mother, for six months or a little more, its flesh becomes an aliment more nourishing and digestible than that of a lamb of the same age that had been weaned as usual at two months old.

Capra, or the goat kind. The flesh is more dense and insoluble than that of the sheep, partly from its nature, and partly from its food and exercise; so that even the flesh of the emasculated animal is seldom admitted where delicacy of aliment is studied.

Sus, the hog kind. The peculiarity of this aliment consists in the quantity of oily matter which is accumulated in the adipose membrane, separately from the muscular parts, the proportion being greater than in any other quadruped employed in diet

The flesh of quadrupeds is a more nutritious and proper aliment in proportion as it contains a greater portion of oily matter, provided that this is no more than the digestive organs can properly assimilate. In this respect we find the digestive powers to be very different in different persons, in some it is very great, while in others it is extremely limited, it even frequently varies in the same person. To those who admit pork and bacon into the number of their aliments, they prove an easily digested and very nourishing food.

In this species there is the same difference between the flesh of the young and the adult animal, as it would seem, because the young animal is always less fat than that of the adult; the former is therefore more digestible to many persons who cannot digest the flesh of the adult. As in other species, there is a difference arising from sex, and from emasculation, but it is less considerable than in the case of other quadrupeds. This species affords a food prepared in a manner that cannot be applied to any other, *braun*, a substance not readily soluble, affords a great deal of nutriment to persons whose stomachs can dissolve it; it consists chiefly of the adipose membrane, closely compressed, so that much of the oil is squeezed out, while the cellular texture remains so closely united as to form a transparent substance.

Cervus, the venison kind. Three species are employed as food in this country, the stag, the fallow-deer, and the roe. They are all wild animals; and although of a dense substance, yet, when at a proper age and in good condition, they are sufficiently soluble and nourishing. The stag kind, being much exercised, is more dense in substance, and to many tastes more sapid; but as the fallow-deer is most commonly better fattened, it affords a more soluble meat. The flesh of the roe-buck seems to be the most tender of all, but, being generally less fat, is perhaps less readily soluble.

Lepus, the hare. This animal is easily digested, and proves tolerably nourishing. As it is an object of the chase, and often killed after long exercise, it is on such occasions deprived of the oil that should be in its cellular texture, and is then more difficultly digested than when it is suddenly killed.

Cuniculus, the rabbit, is of so dense a substance that we hardly ever employ the adult or older animal. The young are tender and white, and afford an aliment very readily digestible, and considerably nutritious.

The difference between red and white meats depends on the greater number of red arteries, and therefore on the larger quantity of red globules interposed between the muscular fibres. White meats are considered as less irritating than those of a red colour, but what has been said on the gelatinous nature of the former, must not be neglected in the comparison.

ALIMENTS FROM BIRDS.

Cock and *Hen*, of the domestic-fowl. Making allowance for difference of age, the flesh of this species, being always white, is the most tender, and amongst the least stimulating kinds of animal food. *Chicken* is allowed when we fear the irritation of animal food; and, on the general principle of the young of every species being the most soluble, the practice seems well-founded. After a year old these fowls are constantly becoming more difficultly soluble: before a year old the difference arising from sex is not remarkable, but becomes so after that period. The effects of emasculation are considerable: thus the *capon* becomes readily fatter, and retains its tenderness much longer than the cock or hen in their state of nature. A barn-door fowl is certainly an unexceptionable aliment; yet a crammed fowl is more sapid and tender, and sufficiently innocent food.

The *Guinea-hen*, at a certain age, is as tender as the last-mentioned species. The turkey is the same as an aliment, but perhaps somewhat less soluble.

The *Peacock* is considerably less soluble than any of the preceding: it is only brought to table, in Europe, in its youngest state.

The foregoing are the domestic species of the gallinaceous order. Of the wild kind, the pheasant, from its greater exercise, is less soluble than any of the domestic fowl, except when it is very young.

Of the *Partridge* kind, there is a great variety, yet they seem not to differ materially. The partridge of this country is much more tender than the pheasant. The *Quail* is nearly the same in qualities

Anseres, or water fowl. The flesh of the swan is solid, and so difficult of digestion that it is little employed as food.

The *Tame Goose*, is of qualities approaching those of the swan, but, as less exercised, and living much on vegetable aliment, is of a more tender substance. Those sea birds that live on fish are very often tender and easy of digestion: they are commonly of a strong odour, and a rank fishy taste. but to some persons their sapid and tender flesh is highly agreeable, and easily digested. These circumstances are particularly applicable to the peculiar Scottish food, the Soland goose, which to many, even in Scotland, is highly offensive, and entirely rejected, while with many others it is in the highest degree of favour.

Of the *Grallæ*, it is only necessary to notice the woodcock and snipe, in which the muscles of the breast, much exercised in flying, are of a firm, and less soluble texture, while the legs, little exercised, are more tender.

Of the *Passeres* it may be said, in general, that when fat they are sufficiently tender and digestible The domestic pigeon, when very young, is sufficiently tender; yet even in its early age is heating food.

Eggs of Birds. It is a singular fact, that the white of egg, whether in its liquid or coagulated state, constantly produces much sickness in the stomachs of some persons, while to most others it is an agreeable and easily digested food. It is indeed surprising what a quantity of egg can be digested by some: in most persons, however, this power is very much limited, and a smaller bulk than of nearly any other food will satisfy. During its digestion, it is less stimulating than almost any other kind of animal matter. When in a state of putrefaction, it becomes highly noxious. Certain sea-fowl, the flesh of which is rank in odour and taste, afford eggs that are perfectly free from this peculiarity.

ALIMENTS FROM THE AMPHIBIA.

The *Turtle* affords a white meat very much resembling that of quadrupeds; and from this we might judge that the difference in nutritive power cannot be very great. In the flesh of the *frog*, there seems to be nothing peculiar nor very different from the turtle. The flesh of vipers affords a broth, of much the same qualities as that made from quadrupeds or birds

ALIMENTS FROM FISHES.

There is certainly some difference in the firmness of the flesh of fishes, but it is a curious fact that, although fishes are long-lived animals, their flesh does not become tough with their age, as that of birds and quadrupeds is well known to do. The common opinion is, that fish is less nourishing than meat: Haller found himself weakened by living on it, and alleges that persons generally experience a similar effect. The observations of Pechlin seem particularly to confirm this. But there may be much fallacy in the opinion, and the weakness may be owing more to the quantity of vegetable aliment employed at the same time, than to that of the fish. We have several instances of villages inhabited by fishermen who, although they live very much upon this kind of aliment, manifest no diminution of health or vigour. If there is any difference in the nutritive powers of fish and meat it must be very inconsiderable: the more gelatinous and tender kinds, as the cartilaginous fishes, will be more easily digested and more nourishing than those of a firmer or drier texture. The oily fishes give an aliment less easily digested, and more irritating to the system, but at the same time more nourishing than the leaner. We have examples of this in the eel, salmon, and herring. Our herring-fishermen, living for a length of time on this last aliment alone, suffer no loss of strength, but seem rather to be always much fattened by it.

ALIMENTS FROM SHELL-FISH.

The flesh of the *Crab* and *Lobster* scarcely differ in any of their qualities. As aliments, they seem to be of the same nature as most other fishes, especially those which contain little or no oil, and on account of the deficiency of this principle they perhaps afford less nourishment. They appear to be more difficult of digestion than most other lean fishes. Some persons are remarkable for being unable to take even a very small quantity of lobster or crab without being affected soon after with a violent colic, and sometimes with the same efflorescence on the skin which often happens from eating salmon or herrings.

The *Oyster* in its raw state, is easy of digestion, but when boiled or roasted is more difficult, and often very much so. Oysters seem to be very nutritious.

The *Mussel* and *Cockle* are of a firmer texture than the oyster, and are less easily digestible. The occasional ill effects of the former have been already noticed.

CHAP. VII.

ACCOUNT OF VEGETABLES USED AS FOOD BY THE VARIOUS NATIONS OF THE WORLD.

Having now given some account of the chief articles, from the animal kingdom, that are used as food by the various nations of the globe, as well as the processes to which they are subjected to fit them for reception into the stomach, and an explanation of the nature and objects of these processes, it remains to treat of those alimentary substances which are derived from the vegetable kingdom. In the history of the seeds, roots, herbs and fruits, which constitute our vegetable sustenance, there is little that can prove attractive, at least that could properly become a part of a work not devoted to the physiology or culture of plants. The notices of these articles of diet shall therefore be generally short, unless in such instances as, being of great and extensive utility, require a full description.

As to arrangement, it would answer no good purpose to adopt a scientific classification, for space would thus be occupied that can be employed to better advantage. The arrangement that will best answer the purpose in the present instance is the alphabetic one, and this accordingly shall be made use of.

Some of the articles which follow are not to be considered as aliments of a nutritious nature, but merely as condiments, and as such are not only agreeable, but frequently most useful.

ALPHABETICAL ARRANGEMENT OF VEGETABLE ALIMENTS AND CONDIMENTS.

Acorn. The old Saxon word, æcern, signified corn of the oak, a name indicative of the use to which it was applied. Before corn was cultivated, men fed upon acorns; and in modern times they have done so frequently when other sustenance was not procurable. The people of Chio sustained a long siege without any other food; and in 1709, during the scarcity that prevailed in France, they were eaten, husked and boiled. Even in the present day the Norwegians, in times of scarcity, grind them and make them into bread. Not only has the acorn been used as food, but as a dessert fruit; and in this capacity it was formerly used by the

Spaniards. It also served the purposes of the physician, and was extensively employed in medicine. It is well known that acorns afford excellent food for hogs, and that they grow fat on them; and hence, in countries where there are oak-forests, the hogs are turned in when the oak-trees begin to drop their acorns.

This nut is said to be the best substitute for coffee. The husks are to be taken off, and the nuts roasted in the usual manner until they are sufficiently brown: a small bit of butter is to be thrown on them while still hot, and, after being well shaken, they are to be ground. The butter supplies the place of the empyreumatic oil that is generated during the roasting of real coffee; and the heat is sufficient to give the necessary degree of empyreuma to the butter.

Almond This fruit is produced in Syria, Barbary, Turkey, Cyprus, Spain, Italy, and France. In sheltered situations they are also produced, of a good quality, in the British isles. There are two kinds, bitter and sweet, both the growth of the same tree; the difference being attributable to variety of climate and soil. Bitter almonds are poisonous to many animals, especially to birds, and even to man. This is not to be wondered at; for they contain Prussic acid, one of the most deadly and instantaneous poisons known, when taken even in a very small quantity, or even applied to the exterior of the body. Bitter almonds contain this poison in very minute quantity, but a number of them eaten, have been known to produce death; and they are particularly poisonous to birds.

It was shown by Vogel, that when almonds and water are triturated and blended together a white liquor results, which he considered almost precisely similar to animal milk. It is curdled by acids. Cream even separates from this milk, which may be converted into a species of butter. When the oil is pressed out from almonds, the cake which remains, if cleared from every thing soluble, exhibits the properties of animal cheese. Vogel found this kernel to consist chiefly of oil, cheesy matter, sugar, gum, and Prussic acid. Sweet almonds were found by Boullay to consist of a sweet oil, albumen, sugar, and gum. But neither kind of almond contains starch; although the contrary opinion had been always entertained. It is an old notion, that eating bitter almonds previously to drinking wine, prevents intoxication. If so, the Prussic acid is no doubt the agent.

Almonds are agreeable adjuvants to the dessert; but, as aliments, rank very low on account of their being difficultly digestible, owing, as Boullay thinks, to the great quantity of albumen present in them in a solid state.

Apples and *Pears* consist of the same ingredients, but in different proportions: the chief are, acid, water, sugar, gum, and woody fibre. In 100 parts of apple by weight, there are no less than 86 of mere water, and but 13 of other ingredients capable of contributing a very inferior kind of nutrition. The nature and properties of the fermented juice of apples and pears, constituting cider and perry, have been already fully detailed in the first volume of this work. Apples and pears must rank very low as aliments; but they are an agreeable acid-sweet summer fruit. For dyspeptic stomachs apples are not advisable.

Apricot. This is a sweet and wholesome fruit. There are several varieties of it grown in England. The orange apricot is not esteemed: the Turkish is tolerably good: the Breda is a large roundish fruit, of a deep yellow colour when ripe, and orange within: the flesh is soft, full of rich juice, and higher flavoured than any of the rest: but the Brussels variety is the best of all; it is red on the side next the sun, the other side being greenish-yellow.

Arrow-root. The powder thus called is the starch obtained from the root of the maranta arundinacea, a plant which grows abundantly in the West-India islands. The cleansed roots are pounded to a pulp in wooden mortars, and the pulp is well agitated with a large quantity of cold water, which is thereby rendered white with the starch floating in it. By straining this water, the fibrous matter of the root is all detained, the water and starch pass through, and a white granular matter subsides: the water is poured off, the powder is collected and dried. This is the substance called, in commerce, arrow-root: it is in fact starch, and possesses almost the very same properties as starch from wheat. By treating potatoes in the same manner as the roots of the maranta arundinacea, a white granular powder is also obtained which scarcely differs from genuine arrow-root, and accordingly is very commonly substituted for it. See the mode of distinguishing them, Vol. I. p. 346.

This powder, when intimately blended with a little cold water, and mixed with a proper quantity of boiling water; or, better, if after being blended it is mixed with more cold water, and then boiled, a jelly is produced to which highly nutritious powers have been attributed; but I believe unfoundedly. It may sometimes be an adjuvant for children's diet.

Artichoke. This agreeable trifle is scarcely worth notice, when the bottoms of the scales alone are eaten. The part called the choke does not possess any of the acrimony of the plant; it is somewhat sweet and mucilaginous, and is considered tolerably nutritious. Artichokes may be dried and preserved for use.

Asparagus. The summits of the shoots of asparagus are tender, well flavoured, and as nutritious as most other vegetable matter. Some medicinal virtues, and some ill qualities, have been attributed to this plant; but good judges declare that it possesses neither, and that it may be considered as merely an innocent article of food.

Barley, and barley-bread, have been sufficiently described in Vol. I. p. 55.

Barberry. This is a small oblong red fruit not larger than a pea, which grows on a large thorny shrub. The shrub grows wild in many parts of Britain: its leaves are small, oval, and of a pale green colour: they, as well as the blossoms and the fruit, are of a sour taste, owing to the presence of the same acid as exists in apples. Barberries are too sour to be used as nutriment by themselves, but they are of use for various forms of pastry.

Bean. This seed is a very general favourite, and contains much more nutriment than most other vegetables. According to Sir H. Davy, rather more than half its weight is matter capable of nourishing. The husks of young beans are tender, but that of old ones is somewhat tough; and when such are used the husks are generally removed, although to stomachs in good order they are in no degree inconvenient. Beans are, to many persons, flatulent diet; they are the better for being young. When fully mature, they are often dried and ground into meal, from which a kind of bread is made, preferred by some of the labouring poor to food from grain. Dr. Cullen affirms that many who had changed from the former to the latter complained of being rendered weaker, and insisted on a certain allowance of bean or pease-meal. The constituents of the bean are chiefly starch and vegeto-animal matter, both of them good nutriment.

Such was the horror entertained by the ancient Egyptians against beans, that it was considered a crime even to look at them.

Bean-meal was used as a cosmetic by the ladies of antiquity, to remove wrinkles from the skin.

We learn from Mr. Dobell, that the famous Indian soy is made from beans. The beans are boiled until all the water is nearly evaporated and they begin to burn, when they are taken from the fire and placed in large wide-mouthed jars, exposed to the sun and air; water and a certain portion of molasses or very brown sugar are added. These jars are stirred well every day, until the liquor and beans are completely mixed, and fermented: the material is then strained, salted, boiled, and skimmed, until clarified; after this last process it will become of a very brown colour, and will keep any length of time. Many persons have thought that gravy was used in preparing this condiment; but this appears to be not the case, the composition being a vegetable one. There are two or three qualities of it: to make the best requires much care and attention. Japanese soy is much esteemed in China, on account of the superior manner in which it is made; perhaps they have a particular sort of bean. Shopkeepers at Canton, who sell soy, have large platforms on the roofs of their houses, where the jars for preparing soy are all arranged and exposed to the sun, for the consumption of this article is enormous. Neither rich nor poor can dine, breakfast, or sup, without soy. It is the sauce for all sorts of food, gives a zest to every dish, and may be said to be indispensable at a Chinese repast.*

Beet. This root is remarkable for its sweet taste, which it owes to the presence of a large quantity of sugar. In some parts of France, Belgium, and Germany, the sugar is extracted from it and used commonly. One hundred pounds of red beet-root furnish about four pounds and a half of pure white sugar, costing the manufacturer about 3½*d.* per lb. This manufacture was introduced during the reign of Napoleon.

Sir H. Davy estimates the nutritious portion of red beet-root at about 15 lb. in every hundred. Hence it is an useful and to some an agreeable article of food:

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* Travels, &c ii 324.

it is eaten baked, stewed, or boiled, hot or cold: and is also used as a pickle. It may be eaten by itself, or may constitute an addition to salads. A beet-root requires a long time to boil or bake sufficiently; according to its size it will take from an hour and a half to three hours: the common size is twelve inches long, and three or four in diameter. Eaten in quantity it often proves flatulent.

When the sweet juice has been pressed out for making sugar, the cake that remains is capable of furnishing good beer, if used in the same manner as malt. On the whole, beet is a vegetable of the greatest importance; it would soon become an object of general cultivation in the British isles, and sugar would no doubt be largely extracted from it, but that is not the policy of government to encourage it. Hence a duty of 24*s*. per 112 pounds has been lately laid on British beet-sugar. It was formerly used as a medicinal root.

Bread-fruit. This article of food grows on a tree that is about the size of a middling oak, with large oblong leaves. The fruit is about the size and shape of a child's head; it is covered with a thin skin, and has a small core within.

The eatable part, lying between the skin and the core, is as white as snow, and somewhat of the consistence of new bread. It must be roasted before it is eaten, being first divided into three or four parts. Its taste is insipid, with a slight sweetness, resembling that of the crumb of wheaten bread, mixed with a Jerusalem artichoke. There is neither seed nor stone in the eatable part. It must be eaten in its recent state, for, if kept above twenty-four hours, it becomes harsh and difficult to swallow. It is in season eight months in the year. The tree which produces it, grows abundantly in the South Sea islands. The natives have certain processes of cookery, by which they modify it according to their taste; and another, by which they render it less perishable, although its flavour is not improved.

Broccoli, is the Italian name of cabbage-sprouts, but chiefly of a vegetable closely resembling cauliflower, and, so far as taste is concerned, one may be always substituted for the other. It is a great advantage that the two plants bear the heads at different seasons of the year. There are many varieties of broccoli, for it is a plant that is very apt to produce new varieties, and many that were formerly in use are no longer known. Those that have an even, compact, and dense head, are the best, and the same characteristics distinguish the best cauliflower. Both broccoli and cauliflower are excellent, agreeable, and wholesome vegetables, and when the heads only are used, little likely to prove flatulent. Dr. Johnson thought the best flower in the garden was the cauliflower.

Cabbage. Of this esculent there is a great variety, all of them excellent. From the abundance, cheapness, goodness, and wholesomeness of the plant, it appears to be the most useful of all the culinary vegetables. Its quantity of solid nutritive matter has been already mentioned p. 294. It has been a favourite from early ages; the Romans greatly valued it, and the Anglo-Saxons thought it so important an article of food, that they named the month of February *sprout-caul*, caul or kale being the name of that kind of cabbage which does not form heads. So accommodating are the varieties, that one or other is procurable at every season of the year.

Cabbage, or rather kale, grows wild in abundance, along the chalk cliffs of the coast of England, and is used by the inhabitants instead of the cultivated kinds. I have eaten it there, and have been much surprised at its excellence, considering that it vegetates in the clefts of the chalk without any soil round its roots that is discoverable. It is abundant in France, and from its seeds, an oil is expressed, called *oil of colza*, which is much used for burning in lamps.

Of the stems of the summer cabbages, when the heads are cut off, be left in the ground, they will, early in the next year, afford what are called *sprouts*, which are excellent in point of tenderness and flavour.

Red cabbage is used either in its fresh state, like other cabbage, or pickled with vinegar, its colour being beautifully heightened by the acid. The colour of the juice of this vegetable is a fine crimson, but it is rendered purple by many substances; and so sensitive is it in this respect, that even the contact of an iron knife, changes it to this hue; hence it should be cut with a silver knife.

Carrageen. This is the Irish name of the *fucus crispus*, commonly called Irish moss, introduced from Ireland as an article of food within the last ten years. When first gathered, it is of a glossy reddish purple; but when dry, it becomes pale, crisp, and almost horny. When half an ounce of this moss is boiled in a quart of milk, with the usual seasonings, it on cooling affords a *blanc-manger*, which is exceedingly agreeable, and, as many persons imagine, very nutritive,—a position which holds true at least as far as the milk is concerned. It may perhaps add somewhat to the nutritiousness of the milk when used as food for very young children.

Carrot. This favourite root, as is obvious from its taste, contains a kind of sugar; so much so, indeed, that it has been considered a fit subject for the production of an ardent spirit, and a good spirit has been economically obtained from it (see vol. I. p. 245.). About one-tenth of its weight, according to Davy, is nutritious matter. It requires much boiling to render it soft and easily digestible. The carrot is valuable on account of the facility with which it is kept in a recent and succulent state for a length of time, nothing beyond burying it in sand being necessary, and protecting it from frost.

In former days our ladies' heads were decorated with the stem and leaves of carrots, instead of feathers;—how strange are the vicissitudes of taste!

The parent of our culinary carrot is the wild carrot. so common all over the kingdom; its root, instead of being the large, fleshy, red, sweet, succulent one which appears at our tables, is dwarfish, white, dry, and ill-tasted. The seeds of wild carrot were once used in medicine, and were supposed to possess considerable power in several diseases: at present they are not used.

Cassava or *Cassada.* The plant called *Jatropha Manichet* or bitter Cassada grows abundantly in the warmer parts of the western hemisphere, and is much cultivated in the West Indies. The roots of it which are the useful portion are, in their natural condition, a poison: but there are two processes by which they can not only be rendered innoxious, but converted into a most nutritive starch from which excellent bread may be made. The first mode is to expose the root to heat, for this destroys the poison: the second is to separate its juice in which the poison resides. This juice is so exceedingly malignant that the Indians use it for poisoning their arrows: it is therefore a curious fact that the other constituent is excellent food, and it was no doubt singular that a discovery of so unexpected a nature should be made by a savage nation ignorant of the doctrine of proximate principles as well as of analysis. The treatment of the roots is as follows: —As soon as dug they are washed, scraped, and grated. The broken down matter is put into a bag, and submitted to pressure until the juice is forced out. This juice is milky: by allowing it to subside a white starch will be deposited, which is to be reserved for use. But the matter which remained in the bag is the chief object: it consists of the same starch mixed with the fibrous parts of the root: when dried in smoke, it is reduced to powder and sifted, so that the fibrous matter may remain on the sieve. This starch is made into dough and baked into bread.

I do not find in any of the descriptions of this process that after the grated pulp has been pressed, it is washed to separate the poisonous juice that must still adhere. If no such washing is employed, we must suppose that the adhering poisonous principle is rendered innoxious by the heat to which the starch is subjected in the process of converting it into bread, either by being volatilised, or by suffering decomposition, as some other poisonous principles are known to do when even moderately heated.

There are some species of this plant which by similar treatment cannot be made to afford a harmless cassava starch.

The sweet cassava plant is free from any noxious property; its stalks are green, whereas those of the other kind are rather of a purple hue.

Tapioca is obtained from the same plant by a process nearly the same as the last, but the starch by a trivial change of manipulation is made to assume a somewhat different appearance. Tapioca may be considered the starch of the Jatropha Manihot as much as cassava, although the form is a little different. It is common food for invalids and children in this country, and is deemed nutritious.

Celery is one of the few plants that not only is an excellent vegetable when eaten raw, but when boiled communicates to the water its own peculiar flavour in an agreeable manner. Hence it is eaten as a salad, or it is boiled in soups, of which it becomes an excellent ingredient. It is conceived to be one of the best antiscorbutics known. The effects of cultivation in altering the natural qualities of plants is strikingly exemplified in celery: for wholesome as it is well known to be, the original herb wild-celery is highly narcotic and unsafe.

Cherry. This fruit when allowed to ripen fully on the trees which it rarely is, seems to be one of the best fruits we possess, provided the tree is of a good kind, and the soil is in proper condition. When permitted to dry on the tree it affords a kind of raisin not inferior to the foreign in sweetness, and superior in liveliness of taste. The may-duke is perhaps the best kind, and the most easily brought to perfect condition. It is difficult to obtain thorough maturition of this fruit; for the flies, wasps, and birds, by their united efforts, soon relieve the trees of their load, if not anticipated. By tying the clusters in pieces of dark-coloured calico, a degree of perfection may be attained of the possibility of which few persons are aware.

The black cherry, on account of the fine colour which it imparts, and the strong taste of prussic acid which its kernel is capable of communicating, is sometimes used for tinging and flavouring ardent spirit: but its sweetness is heavy, and wants the liveliness which is valued in such liqueurs. On this account the Morello cherry is preferred, although its colour is inferior, and its taste when the fruit is eaten by itself is rather an acerb-sour, combined with a full sweetness.

The best process for flavouring ardent spirit with this fruit is the following Take Morello cherries one pound, put the fruit into a large glass bottle having a wide mouth. Put also one quarter of a pound of black cherries into the same bottle, and pour on one pint of the strongest brandy Frequently shake them for four days, then decant the spirit off, pour on an equal quantity of brandy, let them stand ten days, pour it off also, and mix both spirits. Next pour on the fruit half a pint of water; let them stand a fortnight frequently shaking; then invert the bottle and let it drain for an hour The water will be now exceedingly spirituous, and will have extracted all the flavour from the kernels, although they had not been broken. Mix the water with the spirit, and let them become transparent by subsidence. Thus there is no loss of brandy nor of any useful portion of the fruit.

The Morello cherries should be taken from a tree rained against a brick wall, and the darker the colour of the brick, the fuller will be the flavour of the cherry, owing to the higher temperature which the tree and fruit will acquire. The aspect should be such that the strongest sun will shine on the wall. Under these circumstances the Morello is a fine fruit. Their size should be such that 76 will weigh a pound. Small ones will not impart so rich a taste. Their colour should be a bright purple, as if otherwise, it will prove that all the qualities of the fruit have not been developed in it. This process will afford a cherry-brandy both excellent and economical.

Chestnut. The tree which bears this nut, is at least as valuable as most others; its foliage is thick and spreading; its timber handsome, hard, and durable, and its fruit agreeable as well as nutritious. The substance of the nut is farinaceous, of a pure flavour, without rankness or rancidity, for it contains but a small quantity of oil. To some persons, raw chestnuts prove flatulent, and productive of some other disagreeable effects; but the objectionable property may in a great number of instances, be removed by roasting; and by this process many will consider that the flavour is improved. The chestnut is modified into a variety of forms by the culinary art; at least two dozen dishes are in use, of which it is the chief ingredient; amongst them is chestnut-soup made without any meat.

Chocolate. The solid paste known by this name, is prepared from a nut the produce of the *Theobroma Cacao*, a tree which is a native of South America. It bears fruit shaped like a cucumber, containing a pulp bedded in which are the seeds or nuts. These nuts are familiar to the public, they being of late years sold in all grocers' shops. They contain a quantity of oil in a state of union with the other ingredients; but when the nut is parched or scorched, which is always done as a preliminary process, the oil is in some degree detached, and becomes a source of a little inconvenience.

The following is the preparation which these nuts undergo. After being lightly scorched, the shells are detached; the kernels are ground to powder in a mortar or mill, and the powder is then levigated with a flag and muller, or between rollers driven by machinery, until they are reduced to a smooth paste. For such is the peculiarity of this kernel when scorched, that it is at first quite dry, and easily reduced to powder under the pestle; but by continuation of the process, the oil begins to separate, and sufficient is detached to convert the whole into a soft paste In this state, levigation reduces it to perfect smoothness, so that were it diffused through water (for it never dissolves), the fine powder would remain some time suspended. The paste, if left to itself, would again harden; but heat is applied, which makes it still softer, and then it is put into tin pans, where it is allowed to become solid. When taken out, the cakes constitute the chocolate of commerce.

It is a curious circumstance, that when the cakes are removed, the pans are found highly electrical, and will attract and repel light bodies.

Other articles are frequently mixed with the paste during the levigation, as vanilla, long-pepper, sugar, musk, or other perfume, according to the fancy of the manufacturer.

Chocolate to be good must be new: it deteriorates by keeping, and at the end of two years has lost the finest part of its flavour.

Whoever wishes to have the pure chocolate without being *drugged*, has no more to do than to purchase the scorched nuts, and to grind them in a coffee-mill without having removed the shells. The fine smell of this, when newly ground, gives evidence of its superiority over every other form of chocolate; and its taste, when brought to table, will complete the proof. The economy of this method may also be considered a recommendation. The shells coarsely powdered were formerly sold under the name of *cocoa* or *miserable*, and boiled in milk and water, were much esteemed.

The great imperfection of this aliment is the tendency of the oil to separate and to float on the surface, a state which renders it disagreeable to the palate of some, and to the stomach of others. This tendency is natural, considering that the kernel of the nut is emulsive, that the imperfection of all unalkalised emulsions is their holding the oil so feebly combined, and that the tendency is greatly increased by the roasting which the nut undergoes. A mode of lessening this disagreeable quality of chocolate is either to skim it, or to let it cool after it has been boiled, and then to pour off the clear portion from the butyraceous oil on the top and the sediment at the bottom. This liquor may then be heated again. A slow simmer is the best mode of treatment: boiling tends to detach the oil.

Compounds of chocolate and sugar are made into a variety of sweetmeats to be eaten without further preparation. Of this kind are various imitations in form of almonds, walnuts, &c., so admirably executed by the smeetmeat confectioners of Paris.

Chocolate is considered a most wholesome and nutritious beverage, and for those who like it, and with whom it agrees, preferable to tea or coffee. It is apt, however, to create, with many, a sense of heaviness in the stomach, resembling slight repletion.

Cloves. These are the flower buds not yet fully evolved of the Eugenia Caryophyllata, a native of the Molucca islands. They are collected while green, and are then dried and smoked. The best are large, dense, and brittle, of a reddish-brown colour, of a hot burning taste, and capable of showing signs of an oily exudation when pierced with a pin. These characteristics distinguish them from such as have been distilled to obtain the oil, a fraud sometimes practised.

The oil of cloves possesses all the excellent qualities of the spice itself, and is so much more convenient to use, that the neglect of it in the culinary art is quite surprising.

Cocoa. The cocoa-nut tree is unquestionably one of the most important of any that grows in the forest. By far the best account of it and its products that I have seen, is contained in a short work by H. Marshall, Esq., deputy inspector-general of army hospitals; from it, therefore, I select a few details.

The tree is erect, without branches, from 60 to 110 feet in height, and from 1 to 2 feet in thickness, and is crowned with a bunch of fronds. Some trees will bear blossoms every four or five weeks; hence there are generally fresh flowers and ripe nuts on the tree at the same time. In good soils a tree will produce 100 nuts annually.

The roots are sometimes masticated in place of areca; baskets are made of the small ones. The hard woody shell of the trunk is used in building huts, and for making drums; it is capable of receiving a polish that rivals agate. The reticulated cloth is made into couches for young infants, and is also used for strainers. The terminal leaf-buds, when boiled, form a good substitute for cabbage: they are also pickled with vinegar. Of the fronds or leaves are made baskets, and masks to protect the face from the sun; houses are thatched with them, and ceilings formed. The immature leaves are transparent, have a fine texture like satin, and are used for making lanterns; they are also employed for writing letters, the writing being scratched on the surface with a pointed iron stylus. The woody ribs of the leaflets are used for making combs, baskets for catching fish, brooms, and tooth-picks. The leaves serve as alarm-bells, for one of them being hung to the stem of a fruit-tree, a nocturnal thief in ascending causes it to shake, and it makes such a rustling noise that there is a chance of awaking the inmates of the adjoining huts. Of the leaves are made torches for night-travelling, and for keeping off wild beasts: their ashes, containing much potash, are used for scouring in place of soap. The centre rib of the leaf is used as a paddle for rowing boats; and the end of it, when well bruised, forms a brush for white-washing, &c. The stipe of the leaf is made into an Æolian harp, and also is manufactured into sails of canoes. The fibrous coverings of the blossoms are made into torches, coarse cordage, and aprons or rather petticoats for the women. The flower yields a rich saccharine juice which is converted either into sugar or arrack. The nuts afford drink and solid food, the hollow of the interior is filled with an aqueous liquor of a sweetish taste, the kernel is white, and pleasant to eat. On this the natives feed, and labour from morning till night without any other article of diet. When this kernel is pressed, it affords a milk which the Europeans in Ceylon, use as such in their tea. The fibrous husk of the nut, when steeped in water and well beaten with a stone, affords a material for making excellent ropes, for stuffing mattresses, cushions, &c. When the kernel is dried somewhat and expressed, it affords oil at the rate of three pounds or perhaps pints from thirty-two nuts. This oil comes to Europe, and suffers a separation of its solid part, which is made into cocoa-nut candles, and its liquid part, which, burns well in lamps. The oil is sold at Java for 1*s.* 9*d.* per English gallon; in London it brings 4*s.* or 4*s.* 6*d.* A hemisphere of the cocoa-nut shell is used as a lamp to burn its own oil. The shells are also made into tea-cups, ladles, &c. Various products and parts of the tree are used as medicines.*

Thus is the cocoa the prince of trees: it furnishes all that a man can want, and it has been said that where it exists there can be little motive for labour.

Coffee. The introduction of this berry into England has been differently represented. The account which appears most authentic, because written very near the period when it was first used is the following:—" One Mr. Rastall an English merchant, whom I knew, went to Leghorn in 1651, and there founded a coffee-house.

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* Contributions to a natural history of the cocoa-nut tree, by H Marshall, Esq

The next year Mr. Daniel Edwards, a merchant from Smyrna, where coffee had been used time out of mind, brought over with him to England a Greek servant, named Pasqua, who made his coffee, which he drank two or three dishes of at a time, twice or thrice a day, and was probably the first who used it here; although I am informed that Dr. Harvey, the famous discoverer of the circulation of the blood, frequently used it. After this it grew more in use in several private houses, which encouraged Mr. Edwards to set up Pasqua for a coffee-man, who got a shed in the churchyard of St. Michael, Cornhill, where he had much custom, and thus became the first coffee-man in England."* About 1699 the quantity of coffee consumed in England, Ireland, and Scotland was 100 tons a year, of which 70 were used in England: the price of which seems to have been 2*s.* 8*d.* per pound. At the same period, it was sold in chemists' shops.

As to the best mode of preparing coffee for the table, much has been written. Count Romford's essay on this subject is well known, and his instrument the *percolator*, is in common use. Some years since, circumstances induced me to make trial of his methods; the result was a conviction that he had not exhausted the subject, and that new experiments were necessary. It may be of use to enter fully upon this subject with a view of ascertaining the most advantageous method of preparing a beverage, which, viewed as an article of food, of luxury, or of medicine, is highly important.

If a sufficient quantity of well prepared coffee be swallowed in the evening, it will be found to occasion acceleration of the pulse, increased vividness of ideas, hilarity, watchfulness during a great part of the night, and towards morning profound sleep. Difference of temperament may alter these effects, but in general an increased intensity of the powers of life will be observable.

These qualities are not possessed by the raw berry: the power of producing the effects is *generated* in it by roasting, as the following experiments evince. Two ounces of raw coffee were ground to fine powder, boiled in a pint of water for three minutes, and the liquor poured off. This disgusting dose I swallowed at a draught, but could perceive no effect whatever from it. Two ounces of the same coffee were then roasted, ground, boiled as before, poured off clear, and swallowed as before. In half an hour its effects were rendered evident by increased frequency of pulse, which always appeared to be an unerring criterion, increased activity of intellect, a propensity to moving from place to place, and a consciousness of excitement difficult to describe.

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* Houghton Philosophical Transactions, 1699.

Thus it is the scorching that gives activity to the kernel. The obvious effects of scorching are a change of smell, colour, and taste. The taste, from being scarcely bitter, has become considerably so; and if the kernels be very much roasted they become intensely so. The exhilarating quality is only manifested, as appears by the above experiments, when the bitter principle, whatever it may be, is sufficiently developed: there is therefore a connection between the exhilarating and the bitter quality, — a connection rendered manifest in a variety of other examples. Thus Dr. Cullen was of opinion that a narcotic quality resides in various bitters, and conceived that the fact is strongly exemplified in the case of the Faba Sancti Ignatii, the strongest bitter known to him. There are many other examples: opium, hops, cocculus Indicus, brucea anti-dysenterica, nux vomica, henbane, deadly nightshade, foxglove, colocynth, briony, tea, &c. &c., all contain bitter principles which are highly narcotic.

These facts render it probable that there is an intimate connection between bitterness and narcotic power: and that the evolution of an exhilarating property in coffee, by a process which at the same time generates a bitter principle, is no more than a manifestation of the relation of cause and effect. It appears then that the part of the process of roasting which evolves the bitter principle is of great consequence, and therefore the following considerations are deserving of notice.

When coffee is roasted, nothing but ill-smelling water, nearly tasteless, issues from it. After some time the water, which continues to be discharged, becomes acid to the taste, because that impure vinegar called pyroligneous acid, is formed in it, and, in some further time, the acid water is discharged of a yellow colour. Meanwhile the coffee has assumed a fragrant odour, a light brown colour, and a bitterish taste. Shortly after, the water comes off brown, with some drops of a brownish oil of a burnt smell, and the coffee appears blackish. If the roasting be conducted in a proper apparatus we can collect the products; and then we obtain a large quantity of brown liquid of an acid, subastringent taste, like pyroligneous acid, and a brown, strong tasted oil of a tarry smell, becoming, when cold, as solid as soft butter. During the process of roasting, and in the beginning, while the water evaporates off, the coffee appears scarcely changed, but when the water becomes acidulous, the coffee is of a fawn colour; and when the water comes over yellow, the coffee is brown, crackles, bursts, swells to nearly twice its original bulk, and has an aromatic smell, and warm bitterish taste. When the oil makes its appearance, the coffee is almost black, its taste is exceedingly bitter, and it has a burnt smell. If the heat be still continued, the coffee is converted into mere charcoal. Thus there are five distinct stages: first, the evaporation of the mere water, second, the formation of the colourless acid water, third, the production of yellow acid water: fourth, the appearance of the oil; and fifth the conversion of the coffee into charcoal, and destruction of its bitter principle.

In the first of these stages, the bitter principle is not as yet formed, and in the last it no longer exists: both of these may therefore be left out of the consideration; and the question lies between the three middle stages. In the second stage, there is not sufficient bitterness generated for the taste; and in the fourth, there is too much: hence, for the palate, the third stage is the important one. But beside taste, we have to consider the exhilarating quality, and we must endeavour to ascertain does this quality exist in perfection in the third stage, which is so grateful to the palate. Unfortunately, as far as experiments warrant us in concluding, these two qualities do not coexist in perfection. I am aware that experiments, in which the effect on the animal economy is the test, are often fallacious, yet for want of a better guide I am compelled to follow them.

Having roasted some coffee to the fourth stage, that is, until the coffee was almost black and was disagreeably bitter, I boiled one ounce of this for a few minutes in such a quantity of water as produced just three quarters of a pint of liquid coffee. Having drank the whole of this bitter draught, without any addition, I was soon strongly under the influence of its excitement, and my pulse rose from 90 to 120: it was at this time near midnight, yet so active was my mind rendered that I could not retire to rest for nearly three hours after. Now I knew by many previous experiments, that moderately roasted coffee would have had much less decided effects, if drank in the same quantity. Indeed the difference of effect could scarcely be more decisive than in these comparative trials.

Thus it appears that the same degree of roasting which developes the desirable taste of coffee, is not the degree at which the exhilarating quality is produced in *greatest* perfection. To make coffee therefore that combines, as much as the nature of the thing permits, all the advantages in question, it must not be roasted either to the third or the fourth stage, but to the precise limit between the two for then the aromatic bitter is not burnt out, and the exhilarating principle is developed to a considerable extent, although not perfectly.

The practical question now is, how are we to effect this precise purpose?—the question involves many considerations.

From the account already given of the changes which take place in roasting coffee, it appears that the first is the discharge of a quantity of mere water in the form of steam. This process is performed generally in a metallic vessel, which is kept as closely covered as is consistent with the escape of the steam: we may therefore consider the coffee as exposed to a high temperature in an atmosphere of watery vapour. The question then offers itself, does this situation impair the qualities of the coffee? No proof can be, perhaps, given that it does, but there are analogical considerations which render it very probable that an injury is done. In medicine, there are various plants employed which, to preserve them, must be dried; and the drying of them, without injury, is a matter of as much difficulty as importance. Leaves are most difficult; for it is the opinion that if, in the drying, the green colour be not preserved, neither is the virtue. If they are left merely exposed to the air, when dry and reduced to powder, the colour will be found brownish. If dried by the heat of the sun, the colour will be better. If dried carefully before a strong fire, at a sufficient distance, and in such a way that the air has full access to both sides of the leaf, so as to carry off their steam as fast as formed, the colour of their powder will be a brilliant green. On the other hand, if the leaves be exposed to a moderate drying heat, in a situation which prevents the free escape of their steam, as in a deep narrow vessel even without a cover, the powder producible from them will be brown; and in a trial which I made of a gentle heat in so large a place as a baker's oven, the powder was brown. These considerations certainly afford no proof, but I think they render it very probable, that if coffee be dried in its own steam, when it is not quickly carried off by a current of air, the results must be detrimental to its qualities. The following fact also shows that, with regard to the effect on coffee of roasting it in a close vessel or freely exposing it, there is a decided difference:—If coffee be heated in a glass matrass and kept stirring so as to prevent burning, it soon acquires a smell of a disgusting kind; while if the same be performed on a flat surface, exposed to air, there is no such result. If these observations be well founded, here is the first error of the common process of roasting.

When the heat is continued to the coffee after the chief part of its water is dissipated, it begins to grow brown. It is obvious that the interior of each kernel will be less heated than the external portion, and if the outside be roasted just enough, the inside must be roasted rather too little, and *vice versâ*: there will be in the former case, a portion too raw to produce even flavour, much less the exhilarating effect; and in the latter case, the exhilarating effect is produced at the sacrifice of fine flavour, and with the introduction of vapid bitterness. Accordingly we find, invariably, on breaking a kernel of roasted coffee, that the central portions are of a lighter colour than the outside. This constitutes the second error in the common process.

The mere statement of these errors conveys the remedy. Instead of roasting the coffee in an atmosphere of its own steam, it will be better to dry it on a large iron pan over a very gentle fire, keeping it constantly stirring, so as to present new surfaces, until the colour become yellow. In this way, the chief part of the water will be dissipated without exerting any detrimental influence on the substance which is afterwards to form the aromatic bitter. After being thus dried, the coffee should be pounded into coarse fragments, by no means too fine; each kernel, as it occurs, being divided, perhaps, into four or five parts. In this state, it is to be transferred into the roasting apparatus, and scorched to the proper degree.

What the proper degree is should be now considered. The retailers almost invariably roast their coffee too little: the more it is roasted, the greater is the loss of weight on it; the less their profit is at a given price, and the more of it, within certain restrictions, will be consumed to produce a given flavour. I have made a great number of trials to ascertain this point, and I believe that the following conclusions will be found very near the truth. The loss of weight seems to afford the best criterion.

The mere loss of weight will certainly not direct us: for if two equal portions of raw coffee be roasted to the same and proper quantity of loss, one by a quick strong heat, the other by a moderate heat, it will be found that the liquid coffee prepared from each of these, with equal measures of water, will be of very different flavours: that done by the strong heat being vapid and too bitter, and the one obtained by a moderate heat being aromatic and full on the palate. The process should, therefore in every case, be conducted by a gentle heat; and in the following estimates, it is to be understood that such heats were employed.

If sixteen ounces (avoird.) of raw coffee be roasted until reduced to fourteen, the powder obtained will be brownish with a tinge of orange: the taste of the liquid coffee prepared from it will be poor and raw, and it will want the enlivening quality for which it is valued. Yet this is the rate at which the retailers sometimes roast it, and the vapidness and poverty of our coffee are invariably remarked by foreigners. I shall not occupy space with describing the effects of various rates of roasting, but state that my trials have convinced me that the rate at which we combine the greatest number of advantages in roasting, is to reduce fifteen ounces of raw coffee, as obtained from the merchant, to twelve, by a very gentle heat. Any thing more than this makes it too bitter · any thing less does not develope all the perfections of which the process is susceptible. Thus, one fifth of the weight of the raw coffee should be roasted away; the residue, when ground, or even while whole, will be of a bright chocolate colour, and the liquid coffee prepared from it will be a bright brown with a tinge of orange. In cases where weighing cannot be effected, the next best criterion, although a bad one, will be the bright chocolate colour. With regard to the instrument in which the roasting of the coffee should be performed after it has been dried on the iron pan, I am of opinion that it should be as close as is consistent with the necessary escape of vapours; for in this way the dissipation of the aroma is in a great measure prevented. The glass oil flask used throughout Italy answers extremely well, and is by no means so liable to accidents as might be supposed. I have roasted pounds of coffee in one of these flasks: they will roast somewhat less than a quarter of a pound at a time; but it is best to roast only as much as is wanted at once, as it is always injured by keeping, even for a short time, in consequence of the hygrometric water which it absorbs.

The material of which the roaster is made is a matter of some consequence: it should be of such a nature as will not transmit the heat speedily from the fire to the coffee; or, in other words, it must be a bad conductor of heat. If it be a good conductor, the coffee will be permeated by the heat too quickly, and the benefits of a slow fire will be rendered less availing. It is partly on this account that the glass oil-flask succeeds so well, and that the common sheet iron roaster succeeds so badly. Earthen ware would answer as well as glass; but as this is not easily procurable, we may derive the same advantages by other means: if a roaster be constructed of a sheet iron cylinder contained within a wider cylinder, so that there shall be half an inch space between them on every side, we have the advantage of compelling the heat to pass from the outer cylinder to the inner through a stratum of air, which is one of the worst conductors of heat in nature. If this compound cylinder be hung upon an axis, in a frame with a close cover, and a winch to turn it horizontally over the fire, we are provided with a roaster comprising all the advantages of glass, with the durability of metal. Such an apparatus is well worth the attention both of sellers and consumers. It must be observed that the containing vessel should never be filled more than one third: for, by roasting, the bulk of the coffee is nearly doubled, and there must then remain sufficient space to permit the free agitation of the grains, so as to bring all parts in contact with the source of heat.

By attention to all the particulars above described, it will be found what a very great difference there is between coffee rightly prepared and that which is ordinarily made use of, both in point of quality of flavour and produce from a given quantity. To be convinced of the loss sustained by the use of coffee roasted as it generally occurs, it is only necessary to repeat an experiment which I have made. Four ounces of grocer's ground coffee were boiled in successive pints of water until the last had scarcely either taste or colour. The grounds were then separated, dried before the fire, and roasted in an oil flask until a sharp smelling smoke was perceptible. The coffee thus roasted a second time was boiled in a pint of water, and was found to have a strong taste of coffee, although it was too bitter, on account of being accidentally over roasted. Had the coffee been originally roasted sufficiently, the produce of both first and second roasting would have been obtained at once

The next question to be considered is, how are the qualities of coffee to be extracted by water so as to retain all the perfections of previous good roasting?

On this subject there have been various opinions; some pour on boiling water, and let it draw like tea · others boil for a few minutes, others boil for a very long time. A few experiments will lead us to a proper understanding of this part of the subject.

If well roasted coffee be infused in boiling water for half an hour, the liquid will have a certain degree of colour and taste. If the grounds be now boiled in a new quantity of water for a few minutes, it will be found that the boiled liquid has acquired colour, and the peculiar flavour of coffee, with a great degree of bitterness. In the first process, therefore, the boiling water failed to take up the whole of the qualities; for the bitter, which is the exhilarating portion, was left behind, and although this bitter predominated disagreeably in the second liquid, yet had it been extracted by the first, its predominance would have been covered by the aroma and other flavour. Thus, drawing coffee like tea does not succeed; and the reason of this, and a restriction of this statement, will appear in the sequel.

On the other hand, if coffee be boiled on water for a very long time, the liquid produced will scarcely retain any of the characters of coffee but the bitterness: it will be vapid and mawkish. Hence much boiling is totally destructive of fine flavour.*

The result of these facts is, that infusion in boiling water extracts the aroma without the whole of the bitter; that long boiling extracts all the bitter and dissipates all the aroma; and hence we may infer that any effective degree of boiling must be in a slight degree injurious.

The right mode of proceeding is therefore obvious. The whole water to be used is to be divided into two equal parts, one of which is to be drawn on the coffee, but in an inverted order. In the usual order, boiling water is allowed to cool on coffee; but if this be inverted, cold water should be heated on coffee, over the fire, until it come to a boil, and then it is to be removed. This inversion cannot differ from the direct mode with regard to retaining the aroma: but it differs much with regard to the advantage of obtaining the liquid coffee at the end of the process boiling hot, instead of cool, and thus making a reheating necessary, which is always injurious. As soon as the liquor comes to a boil, it should be allowed to subside a few seconds, and then poured off as clear as it will run. Immediately, the remaining half of the water at a boiling heat is to be poured on the grounds; the vessel is to be placed on the fire, and kept boiling for about three minutes. This will extract all the bitterness left in the grounds; and after a few moments' subsidence, the clear part is to be poured off, and mixed with the former liquor. This mixed liquor now contains all the qualities which originally existed in the roasted coffee in perfection, and it is as hot as any taste could desire it. There is little doubt that the pungent aroma of coffee is perceived by the palate much more acutely when the liquor is very hot, and the fact is generally admitted.

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* Count Rumford, see Essay 18th.

The boiling here recommended, with the second half of the water, cannot at this stage of the process be dedetrimental to the aromatic and volatile portions, for these have been already removed and secured in the infused portion.

Those who have a predilection for the method of extracting the qualities of coffee by boiling, on the supposition that this method is more effectual than by infusing, will find their mistake by considering the following experiment: —

A pint of water and 350 grains of well roasted and finely ground coffee were boiled over a spirit lamp for ten minutes, in a vessel calculated to prevent loss by evaporation: the liquid was then filtered off through paper. Another pint of water was poured boiling on 350 other grains of the same coffee, and allowed to draw until its temperature was 154°, which is as low as it is ever allowed to fall: it was then filtered. The liquor in the former case measured 12¾ ounces; in the latter 12½. The specific gravity of both was precisely the same, being just 1.005. The grounds of both, remaining on their respective filters, were dried for ten days in the sun: those of the boiled liquor weighed 270 grains; those of the infused liquor 271. The coincidence was therefore as near as could well be expected, and the experiment shows that boiling and drawing dissolve the same quantity from coffee. And although the grounds of infused coffee will afford additional bitter to new portions of water boiled on them, yet this depends rather on the greater solvent power of a larger quantity of water, than any greater efficacy in boiling. In these trials, the coffee had been ground in a mortar to the finest powder.

If the powder be very coarse there is no doubt but boiling would extract somewhat more from it, as mere infusion would not penetrate the coarse grain so well; or what is the same thing, in so short a time. This explains a statement already made, and which might of that contradictory to our present conclusions, concerning the inferior power of infusing for the purpose of extraction.

In order fully to effect this extraction of the qualities, the coffee must have been ground to the finest possible powder; that which is commonly sold is by far too coarse to answer the purpose well. By roasting the coffee to the degree which I have recommended, it is rendered much more difficult to grind in the mill; for it gets an oily surface which causes the kernels to slip over each other, and hence they are not caught so readily by the teeth of the mill: but the powder, when obtained, is much finer than if the coffee had been less roasted, because it is rendered more friable.

As to the proportions of coffee and water to make a liquid coffee of sufficient strength, much depends on the taste of the consumer. One thing is obvious, that to make coffee of a good quality, we must use a good quantity, be the roasting ever so well executed; and not only this, but the original raw coffee must have been of a good quality I conceive that less than two ounces and a half of well roasted coffee to the Imperial quart measure of water, will not make the required beverage in full perfection, although some palates may prefer it weaker.

There is one quality of liquid coffee on which some stress is generally laid, and which those who study the taste only might consider of very little consequence namely, transparency. Yet it appears to me that uncleared coffee has a less agreeable taste than the same quality if transparent. To effect the clearing, without any addition to the coffee, count Rumford invented an apparatus which, in effect, is the same as the one now sold under the name of *Percolator* But experience has shown that this contrivance is liable to two objections; it does not exhaust the ground coffee of its virtues, and the liquid requires so long to percolate that it is too much cooled before it passes through. Various artificial methods have been contrived to effect the clearing, such as the addition of fish skin, hartshorn shavings, isinglass, white of egg, &c. All these methods succeed tolerably well, but they are not unobjectionable. The skin of the eel or sole clears admirably; but floating on the surface of the coffee, when poured out, will be perceived a thin iridescent film of oil, sometimes in minute globules. Hartshorn shavings require too much boiling; isinglass also requires more boiling than is consistent with perfect flavour. The white of an egg, when hardened by the heat, forms a vast number of shreds which will often pass into the cups when the coffee is nearly all poured out. Yet, with a little trouble, the white of egg may be made the most perfect and convenient clearer of any.

Every one knows that the white of an egg is coagulated into a tough milk-white substance by the heat of boiling water. But at lower heats it is solidified in a very different form If the white of a number of eggs be poured out on a large flat dish, and exposed before a brisk fire at such a distance that they will get but a moderate heat, the water evaporates slowly from them, they diminish very much in bulk, and in the space of 12 or 14 hours they will be solid. The mass is now yellow, transparent, hard, shining' brittle, scaling off from the dish by a mere touch, which is the test of its being sufficiently done. This may be kept in a bottle for almost any length of time, and it will be found a great convenience if reserved for clearing coffee A very small bit of it will answer the purpose; the weight of a silver sixpence will be sufficient to clear three ounces of coffee. All that need be done is to throw the substance into that half of the water which is to be brought to a boil on the coffee, leaving it in after that portion is poured off, and the remaining half of the water at a boiling heat is poured on. When the two liquids are mixed, a minute or two of rest will be sufficient to render the coffee quite transparent.

In this way the coffee produced is a delightful beverage, and so different from the vapid potion commonly called coffee, as to be scarcely supposed producible from the same material. Jamaica coffee, prepared in this way, is far preferable to Mocha coffee prepared in the ordinary way, and is indeed as good as can be desired.

The addition of a single tea-spoonful of port wine to a cup of coffee heightens the flavour, and renders it more agreeable. Mr. Wines informs us, that many of the Spaniards mix ardent spirit with their coffee *; but this addition completely alters the character of the taste of well made coffee.

The practice of keeping coffee roasted and ground, ready for occasional use, seems to be injurious to its aroma. Many people suppose, that by keeping it out of contact of air, as in a corked bottle, it is protected from all ill consequences. Even count Rumford imagined, that by the use of his store-canister, wherein a piston follows the coffee as it is lowered by being consumed, the aroma is retained. It is, however, not the escape of the aroma that is to be feared, but its spontaneous decomposition. There is a remarkable experiment of M. Georgi, which shows clearly that ground coffee is liable to internal decomposition. He roasted a quantity of coffee until brown, and, without grinding it, tied it up in linen, and set it by: — nothing followed. He then ground two pounds of roasted coffee to powder, and tied it up similarly. In three quarters of an hour it took fire, and continued burning until it was reduced to ashes, which weighed half an ounce. Here was not only internal decomposition, but a highly dangerous one. He made similar trials with roasted barley and rice, and with the same results. These experiments were executed in order to elucidate the cause of the mysterious burning of a frigate in the port of Cronstadt, when no fire had been in her for several days before.

Several substances have been made use of at different times as substitutes for coffee, when its price was higher than at present; and the imitations have been tolerably successful. Rye is one of these articles, and the following process has been given:—" The rye is to be well

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* Two Years and a Half in the American Navy, I 308.

cleaned, and then boiled till it is soft; but care must be taken that it does not burst. It is afterwards to be dried in the sun, or in an oven, and then burnt like coffee, and when ground it is fit for use. It may be infused or boiled in the usual way; but if coffee equal to Mocha be required, half of this powder mixed with half its weight of real coffee gives a beverage fit for the Grand Turk or to be served to the guests at the Café Hamblin of the Palais Royal."

Pease and beans have also been used as substitutes, and fraudulently mixed with real coffee. The fraud has been even practised as a trade, and a person prosecuted admitted that he had carried it on for twenty years: the article was known by the name of "Sham Coffee."

Acorns have been considered the best of all the substitutes for coffee, the process for preparing them has been already given. See Acorn.

The Arabians, who have the finest coffee in the world, nevertheless use the husks which enclose it, and this is drank abundantly and frequently.

Cranberry. Great quantities of this fruit grow in the British isles: it is as small as a pea, of a red colour, and a sour sweetish taste. They are used for tarts and puddings, but require much sugar. As a fruit they are agreeable; as an aliment, worthless.

Cucumber. This fruit as food may be duly appreciated by considering that according to the analysis of Dr. John, it contains no less than 97 parts, in the hundred, of water. Of the remaining three parts, only 2½ can prove nutritious. Thus, whoever would wish to derive one ounce of nourishment from cucumbers, must swallow upwards of 2½ pounds of the fruit. It is, however, a pleasant, although not always a safe adjuvant to a weak appetite. Owing to the prodigious quantity of water which it contains, and which would render the taste of the usual condiments almost imperceptible, the common practice of thin slicing, sprinkling with salt, and draining, is indispensable; but not with the view, although usually supposed, of rendering the fruit less apt to sicken.

This vegetable is almost never rightly managed. After being sliced, salted, and drained, so much water is still retained that the vinegar when poured on becomes too weak; hence after the first draining new salt should be applied, and the draining repeated. But now the fruit is too salt: hence it should be rinsed with vinegar to remove the excess, and then the final vinegar may be poured on.

Currant. The red and white currant are merely varieties of each other, and are scarcely distinguishable by mere taste. Both are agreeable acid-sweet summer fruits, reviving and cooling in their effects, but scarcely nutritious. The black currant has a peculiar taste, pleasant to some persons, but so heavy that a much less quantity of the fruit palls the appetite. The black seems to be more mucilaginous than the red or white.

When red or white currants are to be made into jam, it may be of use to know that the evaporation over the fire should be continued until they lose exactly half their weight, otherwise the jam will not keep in all seasons.

Date. The tree from which this fruit is obtained is a kind of palm, the phœnix dactylifera or date-palm. The name *date* is derived from *dactylus,* because it is oval like a finger's end — a fanciful etymology, no doubt. It is an excellent fruit, being rich in sugar, gum, and other vegetable matter, with but little acid. The natives of several African and Asiatic countries make it a chief part of their sustenance; for in these parts the tree is as abundant as it is necessary to the wants of man. There are many kinds, and they occur of all sizes, some being as large as a pomegranate. Formerly they were imported into England from Persia, India, Syria, Egypt, and Barbary: the London market is at present supplied from the two last places chiefly; the Egyptian fruit being the dearer of the two.* The taste is mucilaginous, sweet and bland; and its effects as food highly nutritious, especially in those warm regions where animal sustenance is less prized, and less easily procured.

Endive. This useful plant, equally fit for use as a salad, a ragout, a potage, or a soup, is of various kinds: the curled is less bitter, and is therefore preferred. The endive plant, in one variety or another, is obtainable summer and winter.

Fig. The fig-tree, a native of Asia and southern Europe, was introduced into England by cardinal Pole: two of them were planted in the garden of the palace of Lambeth nearly three centuries since, when Pole was archbishop of Canterbury; and they remain there to this day. The fig produced in Great Britain is far inferior to the Oriental one; but as the recent fruit is a rarity, some trouble has been taken to discover the best mode of cultivation. The effort has been tolerably successful; and from proper soils, where good trees are trained against walls having a south-east or south-west aspect, fair specimens in their most succulent state have been produced. Digging round the roots is to be avoided, as encouraging the growth of wood rather than of fruit; and a stony soil is known to be better than a loose one. The shade of other trees is highly detrimental to the perfection of the fruit.

Filbert. The nut of the filbert-tree is the purest in flavour, and the most free from oil, of all the nut tribe. It accordingly disagrees with few, and is less likely than others to be rancid. More of these nuts than of any other can be eaten without any disagreeable effect, and this amounts to the fact that they are more nutritive.

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* Captain Scott says that the Egyptian dates, the staple of the country, are not to be compared with those of Western Africa. Rambles in Egypt, &c., I. 61

Ginger. This is one of the most pungent and useful aromatics we possess. It is brought from the East and West Indies: there are two kinds, the white and the black; the former is more pungent. The aromatic portion of ginger is a resin, which constitutes about one tenth of the whole root. Ginger in its recent state forms a pleasant preserve, which, in a medical point of view, ought not to be overlooked.

Gooseberry. This well-known fruit, when taken from a good shrub, planted in rich soil, and allowed to remain long enough to become fully ripe, which it rarely is when intended for sale, is highly grateful, and this is probably the amount of its character. As to nutriment it is enough to say that 100 parts of it contain 81 of water, and 8 of stones and woody matter; the remaining ingredients, amounting to 11 parts, and consisting of acids, gum, sugar, lime, albumen, may prove nutritious in some degree. I have observed that gooseberries allowed to become much over-ripe on the bush always acquire a vinous taste, and the sweetness diminishes. Probably the yest and sugar come in contact, and wine is formed in their substance. Gooseberries are now commonly preserved by filling a bottle with them, filling the interstices with water, and slowly boiling the bottle and its contents in a pot of water; then pouring on a film of oil, corking and sealing. In this way they may be kept a year.

Hazel-nut. This is a little more oily than the filbert, and is consequently somewhat more apt to disagree with flatulent stomachs. It is, however, in good seasons, an excellent nut, but prone to spontaneous decomposition. It is certainly nutritious.

Horseradish. This root owes its pungency to the presence of a curious essential oil. Einhoff distilled two pounds of rasped horseradish, and drew off five ounces of an excessively pungent water. In some time, about ten drops of yellow oil subsided, the smell of which when separated, was insufferably pungent: its taste was at first sweetish, but left a burning sensation behind, and the parts of the mouth touched became inflamed. A drop of it let fall on glass quickly evaporated at 59°, and filled the room with the smell of horseradish.

On account of the volatility of this oil, horseradish when dried loses its taste, and becomes inert; for the oil which contains the pungency escapes. Hence it is that this root is never preserved by drying, but by the contrary process of keeping it moist and cold by burying it in sand. And hence it is that when scraped, as for the table, it almost immediately spoils by exposure to the air, for the volatile oil exhales.

Jerusalem artichoke. This is the root of the tuberous-rooted sun-flower, a plant very easily propagated, and abundant in its returns. The root much resembles a potato, and in taste it is not very dissimilar. It is never dry and mealy like a good potato, but moist, soft, and cheesy in texture, although its taste is agreeable, and has a certain degree of resemblance to that of the centre of an artichoke. It disagrees with many, being apt to induce flatulence, and hence it is not a general favourite. To those with whom it agrees, it is certainly nutritious, and is so in a higher degree than a great many others.

Kidney-bean. One of the best esculent vegetables we possess; yet there is nothing remarkable in it that can be described, further than that the pods are tender, fleshy, and well-flavoured. Some remarks have been made page 295 on its nutritive qualities. It rarely disagrees with any stomach that can bear vegetable food in any form; it is therefore very much used. The unripe pods are generally preferred; but the mature beans taken from the pods, are also used, especially in France.

The same account answers for the *Scarlet-runner*, which, however, has the advantage of being procurable during a greater portion of the year, and of producing so handsome a flower that there is a double inducement in introducing it into the garden.

Lemon. The juice of this fruit consists of mucilage, sugar, citric acid, and water, the last ingredient existing in it at the rate of 97½ per cent. There are several processes for preventing its spoiling, the best of which is to separate the citric acid in the state of crystals. Crystallised lemon-juice is now commonly sold by the chemists; but nothing can compensate the loss of the fine flavour of the fruit, which in any of these processes is inevitable.

A French chemist has contrived an economical method of obtaining the same acid as that of lemon-juice from gooseberries. He ferments the gooseberry-juice, distils off ardent spirit from it, which he reserves as brandy, and the residual liquor he saturates with chalk, washes the insoluble powder thus produced, treats it with dilute sulphuric acid, filters off the liquor, and evaporates it so that crystals will form on cooling. By this mode, 100 parts of gooseberries afford 10 of brandy and 1 of crystallised citric acid.

The rind of lemons is much used in cookery: it may be preserved nearly as good as if recent, by putting it into a wide-mouthed bottle with a little strong alcohol. The bottle being well corked, is to be sometimes shaken, so that the alcohol which lies on the bottom may wash over the rind. The alcohol will become as strong of the flavour as the rind itself, and both may be used. The same practice will succeed with Seville orange rind.

It is almost needless to observe that lemons contain no nutriment: it would be useless if they did, as their powerful acidity would prevent their being eaten under any circumstances.

Lettuce. The common garden lettuce is a favourite cooling summer vegetable, more wholesome on account of its diluting or correcting animal food than in consequence of any nutriment which is contained in itself. While young, its juice is merely watery, and has no considerable flavour; but when in flower, this juice is much altered; it is now thick and milky, and its taste is bitter and acrid. If a quantity of this juice be separated and evaporated to dryness, it affords a brown mass, which in taste, colour, and smell resembles opium, and possesses narcotic powers like that drug, although somewhat modified. Some persons have conceived that eating lettuce which was too old rendered them sleepy, — an effect easily understood, when we know that this peculiar opium is present.

Maize or *Indian corn*, as a grain proper for malting, has been noticed vol. i. p. 94. It is a most important bread-corn, on account of the quantity of nutritive matter contained in it. One hundred parts contain 77 of starch, which is about the ratio contained in good wheat. It is the chief vegetable sustenance made use of in many parts of America and the West Indies. An ear of maize furnishes a greater quantity of grain than an ear of wheat, and each grain more flour. It is a late corn, but is defended from the rains by a thick husk: it often grows eight feet high, and the straw is good winter food for cattle. It is much cultivated in France, and is found to be a most profitable crop.

Melon. Of this fruit there is great variety. The best kind has a rugged outer rind of a greenish colour: the pulp is orange; the taste is a sickly sweet, covering a peculiar, agreeable, and strikingly vegetable flavour. Its own saccharine matter is insufficient to impart the degree of sweetness which most palates require; and hence when cut, it is generally powdered with refined sugar. The rind is always rejected; but even the pulp, soft as it is, disagrees with many, and occasions sickness and pain. To prevent such effects, the pulp is frequently qualified with a little brandy, which is not only expedient in this respect, but removes the raw vegetable taste for which the fruit is remarkable. And this is the more necessary, as the melon, to be possessed of its highest flavour and finest odour, should be eaten a day or two previously to perfect maturition.

Melons are not preferred for being large; the small ones which have a firm pulp are considered superior. It is by no means a nutritious fruit; and those of delicate digestion will find little to compensate the risk which they incur by making free use of them.

Mulberry. This is the fruit of a Persian tree long since introduced into England. There are two kinds in use; one produces white fruit, the other black: the latter seems generally to be preferred. It is a mild acid-sweet fruit, of a sickly flavour. Its deep colour renders it an object in making some domestic wines, the tint of the juice being deeper than that of port wine. To strong cider, a little mulberry-juice communicates a pleasing taste and colour; and is often used for that purpose. The leaf of the tree is the well-known food of silkworms.

Mushroom. This is the most savoury of all vegetables; and if it does not contain much that is nutritious in itself, it stimulates the appetite to take an increased quantity of other nutriment. It is undoubtedly one of the most agreeable condiments; and, when of the right species, is very undeserving of the character given to it by Seneca, — that it is a delightful poison. Pliny, indeed, assigns sufficient reason for this bad character; he says that mushrooms got an ill name on account of the poison which the empress Agrippina conveyed to her husband, Tiberius Claudius, through them; and that puff-mushrooms poisoned Annæus Serenus, captain of Nero's guard, with several others, at one dinner. He says that the epicures took delight in dressing mushrooms with their own hands, that they might be feeding on them in fancy all the time.

There is no doubt that many species are most virulent, and that too much care cannot be taken in selecting them. Even the large horse-mushroom, from which catsup is made, should be eaten very cautiously; as in wet seasons, or if produced in wet ground, it is very deleterious if eaten in great quantity: yet the Russians eat all sorts, and even such as would be considered poisonous in this country.

The symptoms produced by poisonous mushrooms are various; sometimes there is violent vomiting, sometimes fainting, sometimes spasms; sometimes all these occur, terminating in death. The most powerful stimulants as brandy and ether, should be freely used, followed by ginger or pepper, but preceded by an emetic.

It is not easy to distinguish the poisonous from the esculent mushrooms. When the smell is offensive, the taste bitter, astringent, and durable, the colour sulphur yellow, or bright or blood red, or greenish, they are to be avoided. Those that are proper for food are generally of a compact, brittle texture, and their substance white. Those that are soft, watery, and slimy, are unfit.

As mushrooms are very perishable articles it is fortunate that there are means of preserving them. They are sometimes dried, powdered, and bottled. The Chinese dry them so skilfully, that it is said they will be at the end of a year, if soaked in water, as good as ever. They are more generally preserved by pickling, but sometimes by a method which sacrifices the fine flavour of this fungus to appearance; for, in order to have them white, their juice, in which all their desirable qualities reside, is in great part excluded. The following observations may be of use:—

When salt is thrown on mushrooms, it will be found after a little time that from being white, dry, and bulky, they are shrunk to one-half their volume, and are now immersed in a dark-coloured liquor. Thus salt acts on them as it does on animal matter; it corrugates them, and causes them to pour out their juices, more especially when they are scalded, as is always done. Yet those who choose to have white pickled mushrooms, pour off this dark liquor, and, by rejecting it, lose all that is valuable in the fungus. Instead of rejecting the juice, measures should be taken for its re-absorption; and this may be effected by a slow process of evaporation, with a moderate heat, in a vessel which exposes a wide surface, care being taken to keep the whole constantly stirred, as well to hasten the evaporation as to avoid burning. The water will all exhale; and the mushrooms alone will remain, their original savoury principle being reabsorbed, and the mere water expelled. Thus the change produced is that their flavour is more concentrated, and they are impregnated with salt. They should not be dried by the evaporation, but left, still soaked, without any redundant juice. The next step in the common process is, to pour on vinegar until the mushrooms are covered; and here is the second grand error.

By pouring on so much vinegar, all the benefits derived from the reabsorption of the juice is counteracted; for the juice is washed out, and remains in the vinegar, instead of being in the mushroom, where it ought to be. The proper mode of proceeding will be to use Beaufoy's or Howard's strongest wood-vinegar, diluted with twice its bulk of water: a very small quantity of this should be poured on, perhaps as much as will rise in the bottle containing the mushrooms to about one-quarter of their height. The bottle, being corked, is to be shaken every day for a month, so that those at the top may come to the bottom; and should the whole liquor be absorbed, more must be added as often as necessary, a slight excess always remaining. In this way, the mushrooms retain their whole flavour, as well as that of the vinegar; whereas, in the common way, the mushrooms act merely as a sponge for vinegar, and in exchange for it part with their own flavour which it was the main point to preserve. The degree of acidity must be determined by the taste of the operator; water or acid may be added occasionally, as required. As to spices; the nicest way will be to infuse them, reduced to coarse powder, in the vinegar intended to be used, previously to its being poured on the mushrooms. The containing vessel being immersed in water, kept nearly boiling for about two hours, to extract the aroma.

The preserved juice of mushrooms or *catsup*, is a far more useful form than the pickle. Twenty pounds of flap-mushrooms will, by the action of salt and pressure, give six quarts of juice, and this should be reduced by evaporation to one half. The facetious Dr. Kitchener gives a formula, which affords so exquisite a liquor that he will not consent to have it called *catsup*, but names it *dogsup;* the dog being the nobler animal. His first precept seems remarkable for prudence: he says, "If you love *good* catsup, gentle reader, make it yourself."

Mr. Accum informs us that a catsup has frequently been sold, composed of the residue of distilled vinegar diluted with decoction of outer green husks of walnuts, and seasoned with spices, the whole being boiled in a copper vessel. A manufacturer informed him that he had practised this for twenty years.

The *Truffle* is a kind of mushroom that grows under ground, and never appears above the surface. For the purpose of discovering them dogs are trained to the scent: the intelligent animal, when he traces out the spot, shows by his anxious barking and scraping that the treasure is at hand; and there a great cluster is generally found. The truffle is the best of all the fungi as food. The morel is less a favourite; it once had the character of being particularly efficacious in creating an appetite.

All the mushrooms approach the nature of animal matter, as appears by their containing azote, and by their taste: they also contain sugar.

Mustard. The seed of this plant, ground to fine powder, constitutes the mustard of commerce. The pungency for which mustard is valued resides in a volatile oil, which may be obtained in a separate form if mustard-seed be distilled with water. This oil contains the whole pungency of the seed; and, as it is not perishable like the mustard itself, might be a very useful article in domestic economy. The seeds also contain a fixed oil, which is bland and tasteless, and might be used as a salad-oil. Mustard, in cases of emergency, may be used as an emetic, and has the advantage of being always at hand.

Nasturtium. This plant, as producing a beautiful flower with lively-green, large, graceful leaves, is one of the greatest ornaments of our gardens; and has the advantage of leaving behind it a seed-capsule, which forms an excellent pickle. Books that treat on these subjects, observe a sweeping rule for preserving condiments, which is very far from being applicable to all the different species. Of this the nasturtium is an example. In this capsule resides a peculiarly pungent aroma, of the horse-radish kind, which is soluble in watery liquids, such as vinegar; and hence, if they be pickled according to the processes given in books, the whole aroma is washed away from the capsule, and none remains in it but what it retains from the acetous infusion.

I found the following process to succeed:—Take nasturtium capsules, when the flowers have disappeared, and when a touch is sufficient to separate the capsule into its three constituent parts; after being wiped by rolling in a moist cloth, let them be put into a bottle, and as much of Beaufoy's or Howard's strongest pyroligneous vinegar as will rise one half the height of the capsules, along with whatever spices may be chosen. Cork the bottle, and shake it every day for a fortnight: the pickle is then fit for use. It will be then observable that the strong acidity has disappeared, as well as the pungent smell of the vinegar, and a weak watery acidulous liquor, which is in fact the juice of the capsule mixed with some vinegar, will be found in its place.

But the nasturtium retains all its pungency; and is indeed as hot as the palate can well bear even when no other spices have been added: the smell also is powerfully pungent. But by the common process, when ordinary vinegar is made use of in large quantity, the smell and taste of the capsule are washed away, and are found in the vinegar, which has been so far diluted by the juices that the whole is of little value. Hence, nasturtiums are little in use; although there is no better pickle when they are properly made.

Nutmeg. The Myristica Moschata affords a fruit about the size of a peach, the external part of which is soft and fleshy; and incloses a shell, of which the kernel is the nutmeg. Between the fleshy outside and the nut is a membranous envelope, which lies close to the shell: this is *mace.* The aromatic portion of the nutmeg is a volatile oil: a fixed oil, of the consistence of butter, also exists in it in great quantity, which when quite free from the volatile oil is nearly tasteless. In one pound of nutmegs there are five ounces of the fixed, and half an ounce of the volatile, oil. The latter answers all the purposes of cookery, with less trouble.

Oat. This useful grain contains about 76 parts per cent. of nutritious matter. Its uses for preparing several kinds of food are well known. A delicate sub-acid jelly is prepared by infusing the husks of oats in water, and suffering the infusion to turn a little sour, then straining it. This whitish water gelatinises when boiled, and in this state constitutes that favourite and somewhat nutritious article *flummery,* otherwise called *sowans,* so much used by invalids and convalescents.

Olive. In various parts of the South of Europe the tree that produces the olive is common, and the fruit, constitutes no small portion of the wealth of the inhabitants. When ripe, the olive is of a bluish colour, and about the size of a small plum. The green pickled olives are the unripe fruit, a great part of the bulk of which is occupied by a hard rough stone. When the olives are ripe, they are laid together to wither a little; they are then bruised and pressed: the oil runs out, and is allowed to settle a few days in order that it may deposit the water and mucilage. When it has done so it is perfectly transparent, and of a greenish-yellow colour: it is called virgin oil. The residual olive-cake is then heated, pressed again, and a further product of oil obtained, but of inferior quality.

Two kinds of pickled olives are sent to London, the French and the Spanish. The latter are larger, and more bitter; and to many persons more disagreeable. The tree scarcely bears fruit in the British isles.

Onion. This bulbous root has not been much examined by chemists. Fourcroy and Vauquelin, many years ago, discovered that it contained manna. The sweet taste of this saccharine substance becomes very remarkable in old pickled onions, when all the acrimony of the bulb has been extracted by the vinegar. Indeed all onions have a sweetish taste. They also found sulphur; and to this they attributed the disagreeable smell, and the power of blackening silver possessed by onions. The other ingredients were phosphoric and acetic acids, earthy salts, and some vegeto-animal matter.

The peculiar smell, taste, and acrimony of onions are destroyed by being boiled, or much heated, or by exposure to the air when cut into slices. It may not be amiss to inform the lovers of raw onions, that the best way of removing the odour of them from the breath is by eating raw parsley, as that of garlic is by chewing leaves of rue.

The qualities of shallots, scallions, chives, garlic, rocambole, and onions, are pretty much the same, but differ in degree.

Herodotus tells us, that on the pyramid of Cheops in Egypt, an inscription in hieroglyphics informed the world that, during the building of it, the sum expended on the purchase of onions, garlic, and radishes for the workmen, amounted to 1600 talents of silver, which, when converted into the value of silver in the present day, amounts to 288,000*l.* If the onions cost this sum, what must the whole expense of the pyramid amount to? what must the resources of Cheops have been? and what must have been the burthens of the people.

Orange. This fruit contains a delightfully refreshing and cooling juice, consisting of less acid and more sugar than the lemon; but in point of nutriment it has little advantage over the latter fruit.

The custom which obtains in the present day of pickling oranges is of great antiquity. A few years since the learned Abbé Facciolati, on opening an Etruscan vase taken from the ruins of Herculaneum, found an orange, pickled in vinegar, in a state of perfect preservation.*

Parsnip. This resembles the carrot in almost all its qualities except colour. The quantity of solid matter attributed to it, by Sir H. Davy, is 99 per cent.; but that all this is nutritious may well be doubted. Its sweet is heavy and peculiar, and renders the root disagreeable to many: it is apt to disagree and lie heavily on the stomach. The same sweet juice exists in salsafi, scorzonera, and skirret roots, which may be used like the parsnip; but they are falling into disrepute.

Pea. This seed has been described, page 295.

Peach and *Nectarine.* A fine peach should be of a deep red colour next the sun, and of a pale greenish white next the wall: the downy skin should be thin; the pulp firm, orange, and full of juice; and the kernel small in proportion to the size of the fruit. It will be easy to foretell what will be the taste of a peach having these characters. It is one of our best acid-sweet fruits, and rarely disagrees.

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* Times Newspaper, Sept. 22. 1834.

The nectarine is a variety of peach, but differs in having a thinner skin and a firmer pulp than the peach, and also in the absence of down on the skin. Both fruits have sometimes grown on the same tree. The character of the nectarine, as a fruit, is the same as that of the peach: neither is capable of contributing much as nutriment.

Pine-apple. The plant that produces this delightful fruit is an exotic, and was introduced into England at the end of the 17th century. It rises thirty inches high: the leaves are long, narrow, and sharp pointed; and from their centre rises the stem, on the top of which is a green pyramidal or oval fleshy substance: this is the fruit; and it is formed of many clustered tubercles, supporting crimson flowers. On the summit stands a crown of clustered leaves. While the fruit is growing, spines shoot out on all sides, but as it approaches maturity these become dry and soft.

Nothing need be said of the exquisite flavour of the pine-apple; this is sufficiently evinced by the trouble and expense incurred in its cultivation, and the high price which it accordingly bears. It should be cut a little before it is quite ripe, and kept a few days.

The name of this fruit is supposed to be derived from the striking resemblance of its shape to that of the cone of a pine tree. It is believed that the skill of the gardener, aided by artificial heat, produces this fruit in as great perfection as it is ever obtained in its native climate.

Pistachio-nut is the produce of a large Oriental tree, which, however, does not refuse to grow in Britain. The nut is rather oblong, about the size of a filbert; its taste resembles that of an almond, but has a greater degree of sweetness and more flavour: its substance is very oily, and hence it is liable to rancidity. It is nutritious, but, like all other nuts, disagrees much with the dyspeptic.

Plum. This tree, a native of Armenia, was first brought to Italy, and thence to the British isles. It now is universally diffused, and there are a number of varieties. Of the twenty-four kinds that are at present cultivated, the green-gage and the mogul are best known; the former excelling in flavour, the latter in size. It is an excellent fruit, being fleshy, acid-sweet, and well-flavoured. There are several species that grow wild in our hedges, as the *damson, sloe, bullace,* and *bird-cherry.* The damson makes one of our best jams; its acrid strong taste, when modified by sugar, softens down into a most agreeable and full-flavour. The plum is said to prove very injurious to health when too freely used; and in seasons when the fruit has been very abundant, dysenteries have prevailed to a great extent. In moderation it is wholesome, and as nutritious as fruits of this substance generally are.

Pomegranate. The tree which bears this fruit is a native of the countries of the Levant; but it has long been naturalised in Italy, France, and Spain, and produces abundantly. In England, where it has been introduced for more than two centuries, it grows, but scarcely ripens its fruit. In shape the pomegranate resembles an apple or quince; it contains a great quantity of seeds, included in a reddish pulp. The juice is sweet, and often acerb. It was formerly a medicinal fruit, and various preparations were made from it. The rind is astringent, and in this capacity was much used.

Radish, a Chinese root, is now well known in every part of Europe: it sometimes assumes a long, tapering form, and sometimes a globular shape; and this last variety is called the turnip-radish. They are both considered wholesome, and pleasant; but they contain little nutriment.

Raisin. This fruit is merely the dried grape; and has been fully described, Vol. I. p. 264.

Raspberry. The red raspberry, on account of the acidity, sweetness, flavour, and colour of its juice, is a general favourite, and is preserved in various forms with vinegar, sugar, and brandy. It will be necessary to make some observations on the last form, because there is diversity of opinion on the best means of impregnating different alcoholic liquors with the flavour. Brandy and whisky are used for this purpose—the former in England, the latter in Ireland. In the following observations I shall allude to ardent spirit of the strength of Irish whisky, which is generally, when old, about 18 to 20 per cent. above proof, on Dicas's hydrometer.

When raspberries, moderately ripe, included in a canvass bag, are submitted to the press, a beautiful transparent red juice transudes: when some of this has been obtained, the pressure must be increased, and the more that flows the greater must be the force applied. Now, the juice that exudes last will be of a lively acid sweet; the first portion, a heavy sweet without acidity; and the middle runnings will be intermediate.

These considerations show how much mistaken those persons are who direct raspberries, slightly broken, to be hung up in a canvass bag, and the unpressed spontaneous runnings only to be used. By such a process all that is valuable in the fruit is left behind.

The cause of this difference in the qualities of the juice obtained by the several degrees of pressure is obvious. The very ripe fruit, which is sweet only, breaks and discharges its juice first; the least ripe breaks last, and hence this portion is sour. From this we learn that the fruit employed should consist of ripe and unripe portions. If the whole be perfectly ripe, the juice will want one of its recommendatory qualities — the acid; if the whole be unripe, it will want the other — the sugar.

The next question to be determined, is the following: — When ardent spirit is mixed with raspberry juice a muddiness immediately appears, which after a while subsides into a voluminous sediment. It has been said that thus a great portion of the substance of the fruit is eliminated and lost; and hence the method has been preferred of infusing the unbroken fruit in the spirit: the question is, what advantage, if any, is gained?

If the sediment, thus produced from a large quantity of the fruit, be separated by straining through a paper filter, and if the sediment be repeatedly washed by allowing spirit to pass through it, and is then dried on the paper, a purple-coloured, hard, horny substance may be obtained, which dissolves in the mouth precisely like gum-arabic, and has a disgusting, mawkish taste, with very slight acidity, along with rather a disagreeable flavour. It retains a strong smell of raspberries for many years. This, then, is the substance precipitated from raspberry juice by the affusion of spirit: and instead of retaining it, the true object is to remove it. The spontaneously exuded juice contains much more of this disagreeable gum than that which has been obtained by pressure.

But it is further to be remarked, that if it were an advantage to preserve the gum in a state of solution, it is not attained by infusing spirit on unbroken raspberries; for the gum in that case remains unextracted from the fruit.

The following seems to be the proper process for impregnating ardent spirit with all the qualities of this fruit, the foregoing facts being assumed as a guide:— Express the juice of ripe and unripe raspberries by powerful pressure, until, from seven pounds, four pints have been obtained. Mix this juice with one gallon of spirit, and shake the mixture well: let it subside for several days, then pour off the clear part; throw the rest into a canvass bag, and press it very gradually until the residuum remains in the bag almost dry. Lastly, mix the two liquors: in some further time a sediment will again appear in the bottom, but the liquor will have become perfectly transparent. This I conceive to be the best and by far the most economical form, although it is a little troublesome.

Raspberries, while still almost green, impart an acidity to spirit far more grateful than that of lemon-juice; but scarcely any saccharine matter, and not much of the peculiar flavour of the fruit.

Rice, the grain most esteemed and most useful in the countries of the East, is grown in India, Turkey, Italy, Carolina, and many other parts. It is considered very nutritious, and is much used as food in all quarters of the globe; the forms in which it is employed are well known. It contains no less than 85 per cent. of starch, which is more than exists in wheat. Carolina rice is a little more nutritive than the growth of the South of Europe, but the difference is inconsiderable.

Rye. One of the chief advantages of this grain is, that it will grow upon poor, gravelly, or sandy, soil; where wheat would not succeed. It is not near so nutritious as the latter grain: Sir. H. Davy attributes but 79 per cent of nutritious matter to rye, and 95 to wheat. The chief use of rye is for bread, which will be much improved if some wheaten flour have been also used From rye a good spirit is also procurable; and its productiveness in this respect has been noticed, Vol. I. p. 94.

Sago is a peculiar kind of starch, obtained by diffusing the pith of a species of palm-tree through cold water, straining to separate the woody fibres, allowing the starch to settle, separating and granulating the deposit by forcing it through a sieve. When the tree is split, the pith is often eaten without any preparation, and is considered nourishing. Sago, boiled in water until gelatinised and then seasoned, is used for children and invalids as light and somewhat nutritious food.

Salep, is the root of the Orchis mascula. The root being washed, baked, and ground to powder, is salep.

Eight grains of this render an ounce of water so thick that it will scarcely pass through a cloth.—(*Gray.*) It is considered nutritious.

Sea-kale. This perennial root has been used for ages by the peasantry on the coasts of great Britain, where it grows wild. Its perfections were first brought into public notice by Dr. Lettsom, about sixty years ago; and ever since it has constantly become more popular. It is one of the most agreeable of all the dinner-table vegetables, as well as one of the most easily digested, it disagreeing with very few persons. When sea-kale is in its greatest perfection it has a singular and agreeable flavour of the most delicate oyster. Many persons prefer it to asparagus, which it resembles a little when the blanching has been duly attended to. This vegetable is easily forced, and is procurable long before Christmas. It naturally appears about February, and is abundant in April and May.

Spinach is one of our most useful and excellent vegetables, being so hardy that it will grow winter and summer, in any light sandy soil, and with little aid from manure. It is a favourite with most persons, disagrees with few, and is at least as nutritious as any other esculent leaf. It is a native of Asia. Wild spinach, a plant indigenous to Britain, is sown in gardens for the sake of the leaves and shoots; the former resembling spinach, the latter asparagus in flavour. Mountain spinach or orache, is also cultivated; and is with some a favourite, although it is rapidly falling into disuse.

Strawberry, a delightful and light fruit; a constant attendant on the dessert-table when procurable, but of little use as food.

Sugar has been amply described in several parts of the first volume of this work.

Tapioca. See *Cassava.*

Tea. On this plant little need here be said. Its natural history, mode of collection and treatment, have been detailed over and over in small periodicals, until these subjects have become almost as well known to the public as the taste of the beverage produced from it. It is sufficient to remark, that of all plants tea resists the extraction of its virtues by cold water with most obstinacy. In a week it would not give out to cold water as much flavour as it would give in half an hour to boiling water. On the mysteries of the tea-table it may be observed, that no art can draw good tea from a bad quality of leaf; and that from a good quality of leaf no want of skill can produce bad tea. Two conditions only are required; that the water shall be boiling, and that the teapot shall be of a material capable of retaining the heat. I conceive, that the British nation lost several millions of money by the introduction, many years since, of a teapot, made of unglazed earthenware, the colour of which was black. Its effect was to disperse the heat by radiation, with great rapidity: the water cooled, almost immediately, below the extracting point; and, after the ceremony of drinking tea, the chief value was thrown away in the residual leaves.

A silver teapot, kept exceedingly bright, at length repays its cost; nothing extracts the virtues of the tea so completely: and, next to silver, the newly invented German silver, in which however there is none of the precious metal, answers best. It is to be observed, that it matters little what the metal may be, or whether it is metal at all, if it is not kept bright; and the more splendid the polish, the better will it act.

The high price of tea formerly held out great inducements to the commission of pernicious frauds in the sale of tea; and much knowledge and ingenuity were expended in fabricating a fictitious article. The leaves of the sloe, the whitethorn, the blackthorn, and other trees, were collected and sold to the *manufacturer*, at two pence per pound. ' It was the province of this artist to dye them with catechu, or logwood; and when he chose to treat his customers with green tea, he coloured the leaves with a little verdigris. (*Accum.*)

Amongst the richer classes in China, tea is served up in a covered cup about the size of an English breakfast cup, on the leaves, without milk or sugar. They drink the infusion before it becomes too strong or bitter, and replenish the cup with water until the virtue of the leaves is quite exhausted. Mechanics and labourers, who cannot afford to drink it as the rich do, on the leaves, draw it in an immense, large, block-tin teapot cased in wood, and having cotton wool put between the wood and the teapot, to preserve the heat longer. Most of the Chinese love to drink their tea very hot.*

An herb grows in Paraguay, which in many respects resembles tea, and is hence called Paraguay tea. It acts like opium in enlivening and producing sleep, for these opposite powers are possessed by that pernicious drug. The long-continued and inordinate use of the herb occasions the same train of diseases as ardent spirits. Kotzebue informs us, that it is used all over the Spanish settlements as tea: it is used in Chili to the amount of 1,000,000 dollars annually. It is served round boiled with sugar, in a silver vessel, along with a sucking-tube, through which each person, if there were twenty, would suck it by taking the tube in his mouth, even though the liquor were scalding hot.†

Walnut. The kernel of this fruit possesses the same qualities as those of other nuts. When recent, but quite ripe, it is less oily, and more likely to agree with weak stomachs than afterwards.

The unripe fruit contributes a favourite exciter of appetite, in the form of a pickle. The external rind is, in this case, the chief object; for at the period when it is employed there is neither kernel nor shell. Its taste is pungent, somewhat like nasturtiums, but weaker, and astringent. The central cavity is filled partly with a pulp, which is the future kernel, and partly with a transparent liquid, from which the pulp is formed. The whitish matter that lines the cavity is the future shell, and it is customary to prove each walnut by sticking a pin through it, lest the shell should have already hardened, for it would then be unfit for the purpose. The test, however, is not infallible; for I have repeatedly observed that the shell actually grows hard long after the fruit has been pickled, just as sufficient local vitality remains in the body of a human being to cause the growth of hair and nails after death. Neither the transparent liquid, the pulp, nor the rudiments of the shell, contain any pungency, this last is confined to the fleshy green outside: and the object ought to be to prevent its extraction, for without it the walnut is a mere sponge for vinegar.

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* Dobell's Travels in Kamtschatka, &c ii. 230.
† Kotzebue's Voyage of Discovery, i 120.

This aroma, or pungency, is soluble in water by long infusion in the cold, or by boiling a short time; the water then acquires the aroma, and the fruit is destitute of it. Yet, in the processes given in books for pickling walnuts, they are directed to be infused in brine for a week, and then to be boiled. The whole aroma is by these means withdrawn, and nothing but bitterness remains.

I conceive that each walnut should be cut into two parts, and each half squeezed between the fingers to force out a yellow mawkish liquor, which, as the fruit is saturated with it, would obstruct the absorption of the vinegar. Being wiped dry, they are to be put into a glass bottle, with the necessary spices, and a little salt. the strongest Bourdeaux vinegar is then to be poured on until the fruit be covered. In two months they will be fit for use, containing their natural pungency and flavour, possessing crispness without hardness. They also retain that peculiar juice, which is nearly colourless in the fruit, but when exposed to air becomes brown; and which, when extracted by water and seasoned with spices and perhaps vinegar, constitutes *walnut catsup.*

It is not the usual practice to cut the walnuts in two when preparing them for pickling: but, beside the advantages stated, it seems to be the best mode of preventing the hardening of the shell, for the presence of a hard shell is a very great defect.

Yam. This is a very large root, cultivated in the West India islands, America, and many other places. The interior substance is white and mealy: it is somewhat like a potato in texture and taste. It is used either boiled or roasted, and eaten without further preparation. Sometimes it is made into bread. Yams are propagated like potatoes, by cutting them into pieces, leaving an eye to each. They constitute a most important and excellent article of food in many countries.

Kotzebue informs us that a plant grows wild at Goat Island, called by the natives *mogomuk,* the root of which resembles a small potato. This root is dried in the sun, and ground to powder: it produces a fine flour, which, when pressed into a lump, resembles chalk, and may be kept a long time without spoiling. When it is to be eaten, a little is broken off one of these lumps, mixed with water in a cocoa shell, and boiled until it becomes a thick pap. In taste it resembles our potatoes.* This root, the potato, and the yam, appear allied in qualities.

Thus ends the list of sources from which man derives his sustenance. About 300 articles of food, animal and vegetable, have been described in this volume;—a small part probably of those which may be employed for that purpose. Although particular animals have been reported by travellers to constitute the food of nations whose history they wrote, we might perhaps extend the catalogue to all living creatures, with the exception of a few that are known to be actually poisonous.

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* Kotzebue's Voyage of Discovery, ii. 2[illegible].

Hunger makes any kind of food acceptable ; and although man in a state of prosperity is an epicure, the meanest thing that creeps would be acceptable in moments of emergency. This is a fortunate constitution of appetite: were it not thus contrived, man would be a more dependent being than he is; his life must fall a sacrifice on more occasions than under present circumstances it does ; and his empire would not have been established from pole to pole — from the luxuriant regions of the tropics to the dreary snows of the north — from the level of the sandy desert to the limits of perpetual frost.

CHAP. VIII.

SOME PROPERTIES AND AFFECTIONS OF THE ORGAN OF TASTE.

The subject of this chapter, curious and interesting as it would become if industriously pursued, has scarcely occupied the attention of those who have inquired into the mysteries of the external senses. The investigation of the properties of the organ of taste is attended with peculiar difficulty, because this sense is more variable than any other amongst mankind, and is not permanent in the same person. On these accounts, I can have no other expectation than that many will dissent from some of the observations here detailed, although they were made under great diversity of circumstances, and at different periods of my life, with a view of forming a theory of tastes,—an intention which I have relinquished as impracticable in my hands. Nevertheless the following observations, a few only out of the many I have collected, may be found to have some interest, and may perhaps stimulate others to an inquiry more fortunate in its results.

The nature of taste has never been explained beyond the simple statement of the fact, that it is an impression made chiefly on the nerves of the tongue and the mucous membrane of the palate.

This impression may be made by the contact of certain solids, liquids, and elastic fluids. Nitrous oxide gas received into the mouth tastes sweet; carbonic acid is acerb; hydrogen has a taste that cannot be expressed: it is perceived on acid fruits which have been that instant cut with an iron knife; ammoniacal gas has an insupportably pungent taste; and chlorine is astringent. The taste of solids and liquids need scarcely be alluded to.

Some solids that have no taste in their ordinary state acquire it in a singular way; thus certain metals have no taste unless they have been recently rubbed; others, that are perfectly tasteless when separate, acquire one when they are brought in contact with each other.

Taste is not an attribute of ponderable matter exclusively; if a stream of electricity be directed on the tongue from a pointed wire attached to the conductor of an electric machine, a distinct flavour is observable. Sometimes tastes are perceived without the application of any external exciting cause to the organ; thus impressions of sourness, bitterness, and saltness, are common results of disease.

Substances used as food have always a certain degree of taste, and, within limits, the more decided the taste the more agreeable the aliment; this quality is called *sapidity*. The absence of it, or *insipidity*, is so great a defect that it renders a substance unfit for food; the presence of such in the mouth is capable of exciting nausea, and even the evacuation of the stomach. To some persons, chewing a soft cork or a bit of white paper is a sufficient emetic. Water, of the same temperature as the mouth, acts in a similar way; but cold water acquires taste from the air contained in it, and its coldness.

Tastes are almost never simple impressions, but are the result of two or more acting at the same time. The resulting effect is often very different from the elementary tastes, and not a mixture of them; and this happens even when chemical combination has not taken place. If wild carrot-seed be fermented on ale, the latter acquires the taste of lemon-peel, although neither the ale nor the seed had the least flavour of the kind* . and the common carrot acts in soups precisely as if salt had been added.

It is a curious fact that the elementary impressions which produce a compound taste need not always be applied to the mouth at the same time, but may be applied as well in succession. The fruit of the shrub called *assabah*, which is common in Dahomy, is nearly destitute of all flavour; if chewed, it nevertheless so affects the nerves serving to the organ of taste that all acids taken afterwards into the mouth appear sweet: vinegar will be mistaken for sweet wine, and a lime for a sweet orange.

This effect is, no doubt, produced by a certain impression left on the nerves of taste, after the cause is withdrawn, and of which the person who makes the trial is not conscious. It would appear that the nerves affected become torpid to that impression, and remain so until they are excited to action by the application of some other; and then the original one revives. A person who eats a raw onion will after a while cease to perceive its flavour in his mouth: but in an hour or two he may renew it by swallowing a cup of tea; or, if the atmosphere be warm, by a draught of very cold water. The taste of a boiled onion is best renewed by a small quantity of brandy, diluted with much water. If the aroma of pepper be diffused over the mouth, the painful heat of it will at length subside; but let the experimenter take into his mouth a little brandy, much diluted, and he will perceive the heat of the pepper to return, and the brandy will appear to him much stronger than it really is. Those who practise frauds on ardent spirits are quite aware of this property of aromatic substances: they first let down the strength of the spirit with a little water, and then bring it up again by infusing Cayenne pepper or cardamom seeds; the stimulus of the pepper on the palate disposes it to perceive the pungency of the spirit, even in a higher degree than it would otherwise have done: and that this is a mere deception of the nerves of the organ is plain, from the fact that the taste of the pepper is not perceived, while that of the spirit is; the latter being so much greater in quantity. The taste of even the strongest brandy will be enhanced if a single cardamom seed had been previously chewed. The contrary practice has been sometimes resorted to; although I believe it is almost universally discontinued. When wine is new, the fiery taste of its brandy predominates on the palate: to disguise this it was not unusual to add to the wine a small portion of sugar of lead (a poison) which, by its sedative effect on the organ of taste, caused the pungency of the brandy to be less perceptible. This was not the only case in which sugar of lead was used.

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* Boyle's Works

To predispose the organ of taste to certain impressions is a device which has been long practised,—perhaps always. It is an old method of creating a relish for wine to preface the exploits of the evening by eating a few morsels of meat, broiled with a large proportion of pepper and mustard: the stimulus on the palate not only continued for some time, but was perhaps reproduced after it would naturally have subsided; and the organ of taste, thus prepared, perceived a more exalted flavour in the wine than would otherwise have belonged to it, the effect being quite independent of thirst.

The burning sensation produced on the mouth by aromatic substances may be reproduced by liquids having a much higher or a much lower temperature than the mouth itself. Thus when the heat of pepper has subsided on the palate, it may be renewed, in a slight degree, by a draught of very cold water; and when the peculiar burning occasioned by chewing peppermint leaves has disappeared, a quantity of hot water taken into the mouth will restore it.

The substances which produce and reproduce a stimulus on the organ of taste need not always be acrid or heating: some that are remarkable for mildness of flavour are equally efficacious. Thus the root of liquorice, when long chewed, leaves an impression of feeble sweetness, which very gradually subsides: as soon as it is no longer perceptible let the person take a draught of buttermilk, and instantly the sweetness will return. The extract of liquorice, sold under the name of Spanish juice, possesses the same property with regard to porter, in a slight degree it is true, but sufficiently to modify the taste of porter in a manner that is agreeable to many: I have accordingly known persons who prepared their palate for a relish of this kind by chewing some of this extract previously to taking a draught of porter. On a somewhat similar principle many people approve of ale after a fruit pie, when weak acidulous wines, as hock, would be disagreeable; for although a sweet and sour form a good combination, the latter does not bear to follow the former.

When stimuli have been applied to the organ of taste, and the perception of flavours has thus been rendered more than ordinarily acute, it will be found that weak and vapid liquors will appear to still greater disadvantage. Of this a person need have no better proof than taking a draught of weak and acescent beer after eating a highly seasoned salad, it will be rendered far more disagreeable; whereas ale, in high order from the bottle, and foaming with carbonic acid, will be rendered more pungent and penetrating than ever. It is on the same principle that coffee should never precede tea, but ought to follow it; and then both beverages will produce their proper effect: this order however is rarely observed, because coffee is an exciter of thirst; the nerves which supply the organ of taste are overpowered by the rough astringent bitterness of the coffee, and are then not in a condition to perceive the delicate flavour of tea—for delicacy is its chief perfection. Those physicians appear to be right who direct that delicate persons should create a relish for a tea breakfast by the preparative of a slice of toasted bacon; few things are more successful in rendering tea enticing.

In culinary combinations of food, spices and other stimulants are used, not merely for the purpose of imparting their own flavour, but with a view of exciting the organ of taste to the perception of the flavour of the meats, &c. of which they are composed, in a higher degree than it would otherwise have been. It is not the biting quality of pepper alone that is valued, and wine is not used in sauces that its taste, as such, may be perceived. The perfection of the art of making culinary combinations is the production of a *tertium quid*, in which the elementary flavours are all lost and indistinguishable in the new one created by their combined effect on the palate.

When the flavour of an edible substance is very delicate and peculiar, the palate should never be excited by powerful stimuli, either previously or simultaneously; for powerful stimuli act as preparatives to other active ones only. There are many instances of this; the natural flavour of sea-kale, when in highest perfection from a proper soil, is one in which may be distinguished that of the most delicate oyster: if it be peppered, the oyster flavour is entirely lost. Again, a cucumber sliced, moderately salted, and well drained, has a striking admixture of the flavour of a cockle; but this is destroyed as soon as vinegar and pepper are added. If dressed cucumber be eaten at the same time with kidney-beans, the latter lose the whole of their peculiar taste in a singular manner.

The temperature at which impressions are made on the organ of taste is of consequence, because it considerably modifies them. Every one must have remarked that salted meat is much more salt when hot than when cold; and that spices have greater power at a high than a low temperature. A weighed quantity of pepper, eaten with an oyster at the freezing temperature, will exert but little energy on the palate, while the same quantity on an equivalent of lobster, heated very hot, will be exceedingly pungent: on this account flavours are often improved by mere increase of temperature; thus very hot coffee is always preferred to the same article when warm: the perfection of a dinner, with most persons, is to have it served as hot as can be; and those who wish for the stimulus of brandy on the palate, without its intoxicating effect, drink it much diluted, but at a scalding heat. Delicate flavours are not appreciated at high heats: thus the finer kinds of tea do not bear to be drunk at a heat above 110° without loss.

A very low temperature is always unfriendly to the perception of tastes, and even pungent ones often become insipid. This is strongly exemplified in a circumstance stated by Captain Parry:—A party, that had lost their way in Melville Island during an intense cold, observed that a mixture of rum and water "appeared perfectly tasteless and clammy." * The best household bread, if reduced to the temperature of 28°, will be found tasteless in the mouth: it has its best flavour at 60°. To most persons an oyster is in its most agreeable state when raw: at the temperature of 70° or 80° it is not in perfection, the want of sufficient coldness is quite perceptible: yet at 32° it is just as bad, and quite inferior to the same oyster at 48°. I was led to make this trial by reading a passage in Pliny where he says, that the Romans cooled their oysters with ice: to me it appears that 48° is the temperature best calculated to develope the flavour.

A draught of cold spring-water is delightful in summer, not merely on account of its coldness but on account of its apparent freedom from all ill taste. Here the organ judges under the deceptive and paralysing influence of cold; for let some of the same water rise to the temperature of 70°, and it will evince that it not only possessed a taste but a disagreeable one. Scarcely any water that issues directly from springs is free from a mineral flavour, and this is chiefly disguised by its coldness.

Some kinds of bad port wine are improved by icing: for the reduction of temperature renders the organ less

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* Parry's First Voyage, p 83

sensitive. The same treatment would virtually lessen the fine flavour of good port; and hence such ought not to be iced. To reduce good port to 32°, would not only render it muddy, because a salt, consisting of lime, potash, and tartaric acid, would be precipitated, but it would lock up its flavour, as it is expressed: it may, however, be advantageously cooled down to 45° or 50°; for then the proper degree of sapidity is developed. Madeira and wines of great body bear a slight elevation of temperature, and suffer an agreeable development of flavour; sparkling Champagne, on the other hand, is improved by cold, for it then better retains its carbonic acid when poured out, and, although in this state it effervesces less briskly in the glass, the taste of the carbonic acid, one of its important constituents, is rendered more perceptible. But even of this wine much icing locks up the flavour

In some instances the desired effect is produced by reducing the temperature of part of the mouth, instead of cooling the liquor. The taste of porter is best at a medium temperature. in warm weather it is considered, by persons who are fastidious in that beverage, to be improved by being drunk out of a metallic vessel. The metal, being an excellent conductor of heat, on being applied to the lips causes an instantaneous rush of heat from all parts to restore the equilibrium, and the porter is received into the mouth while the nerves are at a lower temperature, and therefore the liquor tastes to more advantage. At least this is as good a theory as that, which has been long since advanced, in which the improvement of porter drunk out of a metallic vessel is attributed to the agency of galvanism. So sensitive is the organ of taste in this respect, that if the liquor be covered by a foamy head, which is a very bad conductor of heat, it intercepts the passage of heat from the upper lip, and hence feels warm, and becomes disagreeable whether the vessel is metallic or not.

The organ of smell is allied to the organ of taste, and many analogous phenomena are found to affect the former. In an experiment made by Mr. Boyle, mustard-seed, infused on the juice of apples, afforded so rank a smell of garlic that no one would drink it; yet neither of these substances has a smell in the slightest degree resembling garlic. I have observed that if one first smells to some highly rectified naphtha, obtained from cannel-coal, and immediately after to some spirit of vegetable tar, equally well rectified, the odour of the latter will appear completely changed, and resemble a perfume in which the scent of lavender is very striking.

CONCLUSION

Thus, the chief facts relative to the sustenance of the human body have been noticed, including the state in which they are presented by nature, that which results from the processes to which they are subjected, and the processes themselves. In the latter department, so far as it relates to animal food, I have not descended to particulars: it was not the province of the work to teach the culinary art, but to point out the manner in which it is connected with science, and to explain the scientific principles on which it is founded. Perhaps the time is not far distant, when the march of improvement will induce the professors of gastronomy to elevate their calling, by connecting its practice with the principles of science. There can be no doubt of the benefit that would result from a successful attempt. And although the idea of converting our cooks into philosophers may excite a smile, the conversion may not be less desirable in the art of pleasing the palate with food than with drink. The brewers and distillers of the present day are philosophical chemists: they understand well the principles on which they act: their processes are more certain, economical, and manageable than they were formerly; and errors are not only more easily prevented, but corrected, than they used to be when the art was entirely empirical. Why should not equal advantages be derived from the application of science to those arts which relate to the management of solid sustenance?

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